

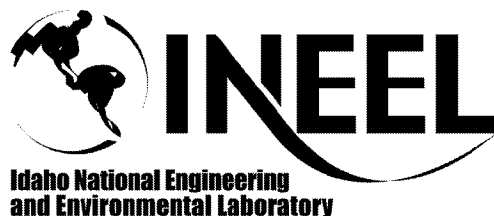
Specification

PROJECT FILE NO. 021052

Backhoe Modifications for the OU 7-10 Glovebox Excavator Method Project

- 1) Preparation for Boot Installation and Field Use
- 2) Auto Lube System
- 3) Backhoe Flow Restrictions
- 4) Boom Cylinder Modification
- 5) Drum Weighing System
- 6) Fire Suppression
- 7) Hydraulic Line Replacement
- 8) Lock Check Valves
- 9) Equipment and Additional Modifications

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1. PREPARATION FOR BOOT INSTALLATION AND FIELD USE

1.1 Summary

1.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd³ of radioactively contaminated waste from OU 7-10 (which comprises Pit 9) at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

A standard CAT 446B backhoe performs waste excavation and core sampling. The backhoe cab and loader are located outside a RCS, while the boom, stick, and various end effectors are located inside the contaminated part of the RCS. The backhoe is sealed to the RCS through the use of an internal and external backhoe boot configuration mounted directly to the backhoe (see Figure 1-1).

Because of the solid frame structure of the CAT 446B backhoe, the sides and bottom of the frame can be used as sealing surfaces. Sealing the backhoe frame to the RCS entails welding metal plates across the interior and exterior of the frame at various locations. The internal boot frame is presented in Figure 1-2 as gray plates. The external boot frame is presented in Figure 1-3.

Because of the safety significant nature of the backhoe internal and external boot assemblies, installation and fabrication of the boot shall be performed by a Nuclear Quality Assurance-1 (NQA-1)-1997 certified Subcontractor. Western States Equipment shall perform all modifications to the backhoe to facilitate installation of the internal and external boot by the NQA-1 Subcontractor. Following receipt of the booted backhoe from the NQA-1 Subcontractor, Western States Equipment shall reinstall specified equipment and restore hydraulic functionality of the backhoe and end effectors. This specification pertains to the preparations necessary for internal and external boot installation, which include equipment relocation, equipment removal, and the retained hydraulic function necessary to facilitate boot installation. Additionally, this specification incorporates the necessary preparations to facilitate field use of the booted backhoe, which

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include additional equipment relocation, equipment reinstallation, and restoration of full hydraulic function.

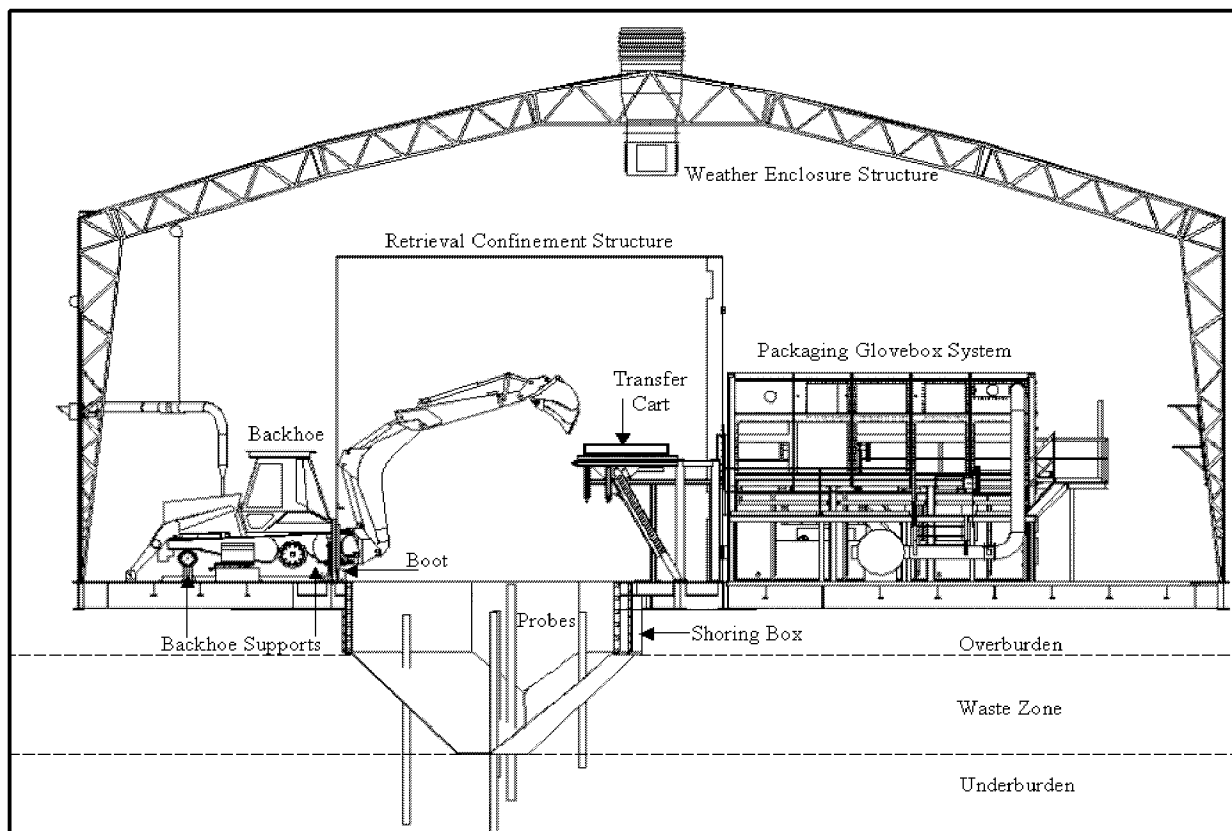


Figure 1-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

1.1.1.1 Preparation for Boot Installation

1.1.1.1.1 Equipment Relocation

In preparation for boot installation the brake accumulator and backup alarm shall be relocated.

A. Brake Accumulator Relocation

The brake accumulator is located directly across from the hydraulic filter on the left-hand frame rail body near the left outrigger frame penetration. The accumulator is strapped and bolted to the backhoe internal frame with a flexible line leading to the

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unit. The brake accumulator shall be removed and mounted to the bottom of the backhoe frame rail near the backhoe's left rear wheel well as shown on Contract Drawing 519932.

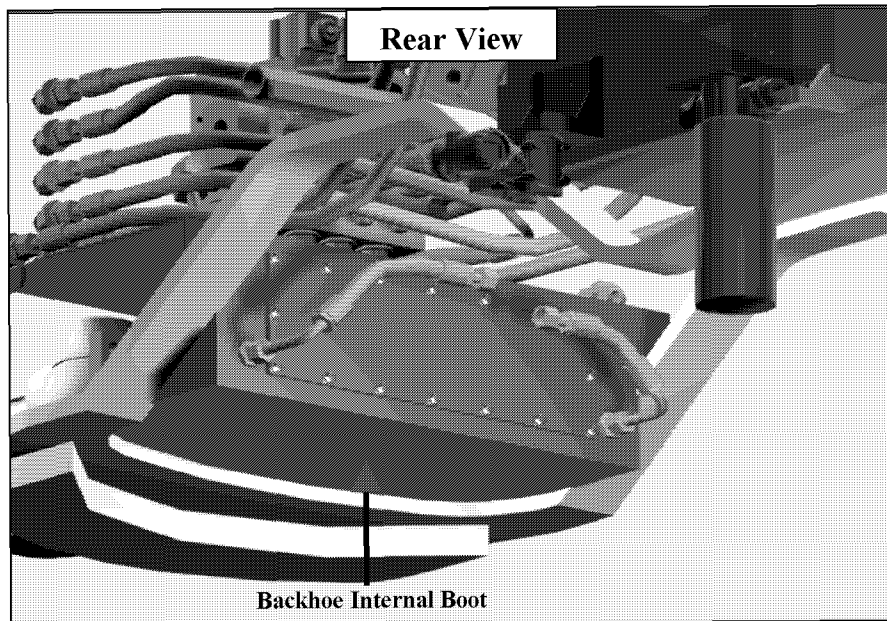


Figure 1-2. Backhoe internal boot.

B. Backup Alarm Relocation

The backup alarm is located within the backhoe frame opening directly above the boom pivot cylinders. The backup alarm and the backup alarm-mounting bracket shall be removed and relocated as shown on Contract Drawing 519932.

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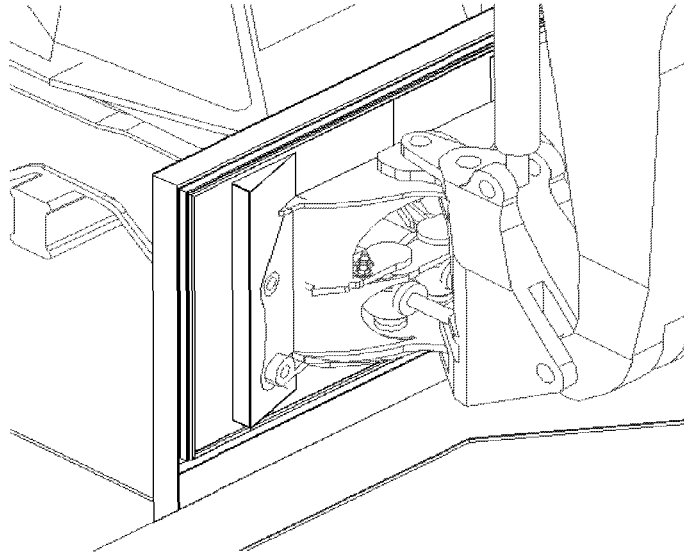


Figure 1-3. Backhoe external boot.

1.1.1.1.2 Equipment Removal

Installation of the backhoe internal and external boot requires temporary removal of the following equipment as shown on Contract Drawing 519932:

- A. The backhoe boom, stick, extendible stick, and bucket
- B. The backhoe swing cylinder assemblies
- C. The backhoe valve body group
- D. The hydraulic lines leading to and from the following:
 - (1) The backhoe valve body out to the boom, stick, and bucket
 - (2) The stabilizer valve body out to the swing cylinders, extendible stick, and auxiliary connections
 - (3) The stabilizer valve body out to the right and left stabilizers

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(4) The solenoid valve leading out to the remote hydraulic coupler (if present)

E. The right and left stabilizers and associated hydraulic cylinders

F. Hydraulic filter assembly and associated hydraulic lines

G. The stabilizer hose brackets.

1.1.1.1.3 Retained Hydraulic Function

Following the relocation and removal of the previously mentioned equipment, the backhoe shall be shipped, by truck, to the NQA-1-1997 certified Subcontractor (selected by the Contractor [Bechtel BWXT Idaho, LLC]). In an effort to enhance mobility of the prepared backhoe, hydraulic functionality of the brakes, steering, and loader bucket controls shall remain functional.

1.1.1.2 Preparations for Field Use (following boot installation)

1.1.1.2.1 Equipment Relocation

Following installation of the backhoe internal and external boot the hydraulic filter shall be reinstalled at an alternate location.

This filter shall be mounted to the exterior of the backhoe battery box as shown on Contract Drawing 519931. Hydraulic fluid-sampling taps (located on either side of the relocated filter) shall be integrated into the lines leading to and from the relocated filter as shown on Contract Drawing 519931.

1.1.1.2.2 Equipment Reinstallation

Following installation of the backhoe internal and external boot, all of the equipment removed in Section 1.1.1.1.2, are reinstalled onto the backhoe, with the exception of the right and left stabilizers

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(including the feet, arms, and cylinders), and the hydraulic lines leading from the stabilizer valve body out to the right and left stabilizers, and the stabilizer hose bracket. A comprehensive list of reinstalled equipment is shown on Contract Drawing 519932.

Hydraulic lines leading from the stabilizer and backhoe valve bodies through the internal backhoe boot and out to the backhoe boom, stick, bucket, extendible stick, hydraulic coupler, auxiliary, and swing cylinders will require an alternate configuration as shown on Contract Drawing 519931.

1.1.2 Work Included

This specification covers the following

- Requirements of Western States Equipment for backhoe preparation to facilitate installation of the internal and external boot by the NQA-1 Subcontractor
- Requirements of Western States Equipment for fabrication, assembly, installation, and testing of the backhoe hydraulic fluid-sampling taps
- The reinstallation of equipment removed to facilitate boot installation and the rerouting of hydraulic lines leading from the backhoe valve group, stabilizer valve group, and hydraulic coupler valve.

It is not the intent of this specification to completely define all details of relocation and removal of equipment on the CAT 446B backhoe. Equipment shall be purchased, fabricated, assembled, installed, relocated, and removed in accordance with this specification and the standard practices of the equipment supplier and Subcontractor when such practices do not conflict with this specification.

The following shall be delivered to the specified NQA-1-1997 certified Subcontractor:

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- A complete, fully integrated, and functional brake accumulator mounted to the lower frame rail of the backhoe near the left rear wheel well in accordance with Contract Drawing 519931.
- A CAT 446B backhoe with the boom, stick, extendible stick, bucket, boom pivot cylinder assemblies, backhoe valve body, and all associated hydraulic lines removed to facilitate internal boot installation by the NQA-1 certified Subcontractor. The boom pivot cylinder trunnion support shall be reinstalled before shipment to the NQA-1 Subcontractor.
- The previously backhoe with the right stabilizer assembly, left stabilizer assembly, and all associated hydraulic lines removed to facilitate external boot installation by an NQA-1 certified Subcontractor.
- The previously mentioned backhoe with the hydraulic functionality of the brakes, steering, and loader bucket controls rerouted and functional.
- The following shall be delivered to Bechtel BWXT Idaho, LLC, after installation of the internal and external boot assemblies:
- A complete and fully integrated hydraulic filter mounted to the exterior of the backhoe battery box near the right rear wheel well in accordance with Contract Drawing 519931.
- A complete and fully integrated hydraulic fluid-sampling taps mounted to the exterior of the backhoe frame before and after the hydraulic filter in accordance with Contract Drawing 519931.
- A complete hydraulic fluid sampling kit.
- A booted CAT 446B backhoe with the boom, stick, extendible stick, bucket, boom swing cylinder assemblies, and backhoe valve body reinstalled.
- The previously backhoe with all hydraulic lines associated with the boom, stick, bucket, swing cylinders, extendable stick, auxiliary, and hydraulic coupler reinstalled as shown on Contract Drawing 519931.

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- Vendor data submittals in accordance with vendor data schedule and this specification.

1.1.3 Work Not Included

The following items shall not be included in the scope of work of the Subcontractor.

- The Subcontractor is not responsible for the fabrication and installation of the backhoe internal and external boot assemblies.
- The Subcontractor is not responsible for the installation of these items (as shown in Contract Drawing 519931):
 - 519931-17 @ 11
 - 519931-18 @ 2
 - 519931-15 @ 13
 - 519931-20 @ 13
 - 519931-21 @ 13

1.1.4 INEEL–Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

1.2 Applicable Codes, Procedures, And References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

1.2.1 National and Local Codes

Occupational Safety and Health Administration (OSHA)

- 29 CFR 1910, “Occupational Safety and Health Standards”
- 29 CFR 1926, “Construction Safety and Health Electrical Regulations.”

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1.2.2 Industry Procedures and DOE Orders

American National Standards Institute (ANSI)/American Welding Society (AWS)

- ANSI/AWS A2.4, “Standard Symbols for Welding, Brazing, and Non-Destructive Examination”
- ANSI/AWS D1.1, “Structural Welding Code Steel.”

1.2.3 Military (National) Specification

Not applicable.

1.2.4 Related Specifications

Not applicable.

1.2.5 References (such as past designs, drawings, and reports)

Not applicable.

1.3 Technical Requirements

1.3.1 General

This section defines the requirements for the hydraulic filter, the hydraulic fluid sampling taps, and the hydraulic fluid sampling taps and kit.

1.3.1.1 Hydraulic Filter

The relocated filter shall be the same thread-on type hydraulic filter used within the standard backhoe hydraulic system.

1.3.1.2 Hydraulic Fluid Sampling Taps and Kit

The hydraulic fluid taps and sampling kit shall provide a fully functional system and perform as specified in a safe and efficient manner.

1.3.2 Restrictions

None identified.

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1.3.3 Performance Requirements

The hydraulic fluid sampling taps and kit shall be capable of retrieving a volumetric sample of the hydraulic fluid without loss of sample or leakage of the installed taps.

The modified backhoe shall retain full hydraulic function of the brakes, steering, and loader bucket before shipment to the NQA-1 certified Subcontractor.

The booted backhoe shall be capable of full hydraulic function (excluding the stabilizers) before shipment to the Contractor.

1.3.4 Software

Not applicable.

1.3.5 Registered Professional Engineer Certification

Not applicable.

1.3.6 Human Factors

The installation shall use human factor engineering principles and criteria such that the hydraulic filter, brake accumulator, and hydraulic fluid taps are easily maintainable. The installation shall provide access to these system components (located outside of the RCS) for operation, cleaning, and maintenance.

1.3.7 Reliability and Maintainability

1.3.7.1 Reliability

All subcomponents of the hydraulic filter, hydraulic fluid sampling taps and kit, and relocated brake accumulator shall be of a quality that the expected mean time between failures for this system shall not be less than 1,080 hours.

The hydraulic filter and brake accumulator mounting systems shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

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The hydraulic fluid sampling taps and sampling kit shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

1.3.7.2 Maintainability

The filter, accumulator, and sample taps shall be installed and assembled to facilitate ease of inspecting, servicing, and maintaining equipment.

The hydraulic filter and sampling kit standard replacement parts, shown on manufacturer's recommendations, shall be readily available for routine maintenance activities.

1.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

1.3.9 Natural Phenomena Requirements

Not applicable.

1.4 Environmental, Safety, and Health Requirements

1.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable OSHA requirements as stated in 29 CFR 1910.

1.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

1.4.3 Emergency Response

Not applicable.

1.4.4 Accident Investigation

Not applicable.

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1.5 Manufacturing and Assembly

1.5.1 General

The hydraulic filter and brake accumulator devices shall be removed and reinstalled onto a CAT 446B backhoe, in the Subcontractor's shop, to ensure proper fit and operation.

The hydraulic fluid sampling taps shall be installed into the hydraulic lines leading to and from the hydraulic filter, in the Subcontractor's shop, to ensure proper fit and operation.

The boom assembly, boom pivot cylinders, specified hydraulic lines, backhoe valve body group, backup alarm, and stabilizers shall be removed from the backhoe in the Subcontractor's shop. The boom pivot cylinder trunnion support shall be reinstalled before shipment to the NQA-1 Subcontractor.

Rerouting and capping of hydraulic lines shall be performed in the Subcontractor's shop to facilitate full hydraulic function of the backhoe brakes, steering, and loader before shipment to the NQA-1-certified Subcontractor.

The boom assembly, boom pivot cylinders, specified hydraulic lines, and backhoe valve body group shall be reinstalled onto the backhoe in the Subcontractor's shop.

The technical representative (or alternate) of the Contractor (Bechtel BWXT Idaho, LLC) will inspect the assembled final product. Assembly and disassembly of the equipment shall be made in a clean dust-free area of the Subcontractor's facility.

1.5.2 Prohibitions

None identified.

1.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in Caterpillar Company standard commercial practice.

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1.5.4 Fabrication

1.5.4.1 Manufacturing/Inspection/Test Plan

A manufacturing, inspection, and test plan shall be submitted by the Subcontractor before shipment to the NQA-1 Subcontractor. The plan shall detail the fabrication, assembly, installation, inspection, examination, and test process to be performed. The plan shall be submitted for approval before Subcontractor initiation of any manufacturing, inspection, or test activities for incorporation of Contractor source inspection hold points.

1.5.4.2 Welding

Welding shall be performed in accordance with the subcontract. All welding shall be performed in accordance with AWS D 1.1 for statically loaded nontubular structures. Welders and weld procedures shall be qualified in accordance with AWS D 1.1 for statically loaded nontubular structures. Weld procedures, welder qualifications, nondestructive testing procedures, and nondestructive testing personnel qualifications shall be submitted to the Contractor for approval before performing any welding. Wherever stress relieving is required to maintain dimensional requirements, it shall be done before machining. Finished weld surfaces shall be free of defects. Welds being ground must be kept cool at all times to minimize distortion and discoloration. The original material thickness shall be maintained after all grinding and polishing processes.

1.5.5 Equipment Tagging

Not applicable.

1.5.6 Cleaning, Painting, and Coating

All surfaces shall be cleaned for removal of weld flux, oil, grease, shop soil, and visible rust. Methods may include cleaning by hot water spray or solvent wiping. The final wash and rinse shall be accomplished with fresh water. Cleanliness shall meet the approval of the Contractor at the time of final inspection.

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1.5.7 Spare Parts

The applicable standard quality requirements identified in the procurement package shall be cross referenced.

1.5.8 Other Processes

Not applicable.

1.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule is included in the attached vendor data schedule.

1.6.1 General Submittal Requirements

1.6.1.1 General Procedures

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

1.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, a drawing or specification reference, and a description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the

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submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required; additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

1.6.1.3 Form 431.13, "Vendor Data Transmittal and Disposition"

All vendor data shall be submitted to the Contractor using Form 431.13, "Vendor Data Transmittal and Disposition Form." The form provides a method for the Subcontractor to submit vendor data and provides a means by which the Contractor may disposition the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), the drawing or specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

1.6.1.4 Disposition by the Contractor

Comments by the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal.

The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appears to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appears to be satisfactory and requires no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:

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- (1) Submittal requires corrections, shown on comments, before final review
- (2) Submittal data incomplete and requires more detailed information before final review
- (3) Submittal data does not meet subcontract document requirements.

D. Accepted for Use. Information Only Submittal:
Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor. Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may provide internal review of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor shall return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

1.6.2 Spare Parts and Special Tools List

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the hydraulic filter, hydraulic fluid taps, hydraulic fluid sampling kit, and brake accumulator. This list shall include all corresponding suppliers of each component and their phone numbers.

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1.6.3 Operations and Maintenance Manuals

Not applicable.

1.6.4 Drawings

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the modified backhoe. These drawings shall document the mechanical, electrical, and instrumentation configuration.

1.6.5 Software

Not applicable.

1.6.6 Weld Requirements

1.6.6.1 Weld Procedures

Welding procedures shall be in accordance with AWS D 1.1 for statically loaded nontubular structures. A copy of the weld procedures to be used in this work shall be submitted to INEEL for approval before fabrication.

1.6.6.2 Welder Qualifications

All welder qualifications and qualification procedures shall be in accordance with AWS D 1.1 for statically loaded nontubular structures. Copies of welder qualifications shall be submitted to INEEL for approval before fabrication.

1.6.6.3 Nondestructive Examination Procedures and Qualifications

Liquid penetrant testing, radiographs, and inspections shall be performed in accordance with Section 1.7.3. All nondestructive examination procedures and inspector qualifications shall be submitted to the Contractor for approval before fabrication.

1.6.7 Inspection Test Plans/Procedures/Reports

Inspection of these documents includes the following:

- Performance test procedures (to be generated before Subcontractor shipment to NQA-1 certified Subcontractor): Performance test plans, procedures, and reports as outlined in Section 1.7.4.1.

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- Performance test reports (to be generated before Subcontractor shipment to NQA-1 certified Subcontractor): Performance test results and reports as outlined in section 1.7.4.2.

1.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

1.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The minimum qualifications of the Subcontractor are listed below:

- The brake accumulator, hydraulic filter, and hydraulic fluid sampling taps shall be relocated, assembled, and installed by a firm that has previous related experience pertaining to rerouting of earth moving equipment hydraulic lines and installation of hydraulic fluid sampling taps.
- A firm having previous related experience pertaining to rerouting of earth moving equipment hydraulic lines and disassembly and assembly of a CAT 446B backhoe shall perform all backhoe disassembly and assembly activities.
- A firm having previous related experience pertaining to rerouting and capping of hydraulic lines on a CAT 446B backhoe shall perform all hydraulic line modifications to ensure functionality of the brakes, steering, and loader bucket before shipment to the NQA-1-1977 certified Subcontractor.
- A firm having previous related experience pertaining to rerouting and capping of hydraulic lines on a CAT 446B backhoe shall perform all hydraulic line modifications to ensure functionality of the boom, stick, bucket, extendible stick, hydraulic coupler, auxiliary, and swing cylinder bucket before shipment to the Contractor.

1.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

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1.7.3 Nondestructive Examination

1.7.3.1 Weld Inspections and Examinations

Visual examination shall be performed for workmanship and all materials and components of the structure, as specified in this specification.

Visual examination of welding shall be performed in accordance with AWS D 1.1 for statically loaded nontubular structures. Personnel performing visual examination of welds shall meet the requirements of AWS D 1.1.

1.7.4 Operational Testing

1.7.4.1 Performance Test Procedures

NOTE: *To be generated before Subcontractor shipment to NQA-1 certified Subcontractor.*

The equipment supplier or Subcontractor shall submit to the Contractor an in-shop testing plan and procedure before conformation of internal frame accessibility, and the specified hydraulic functionality at the Subcontractor's facility. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The Subcontractor shall inform the Contractor one week in advance of performance testing so a Contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all specified systems and equipment operate and interfaces together into a functional system as defined within this specification.

Testing acceptance includes the following criteria:

- Confirm accessibility of the backhoe internal frame within the vicinity of the internal boot assembly before shipment to an NQA-1 certified Subcontractor.

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- Confirm hydraulic functionality of brakes, steering, and loader bucket before shipment to an NQA-1 certified Subcontractor.
- Following installation and reinstallation of the boom assembly, boom pivot cylinders, hydraulic filter, hydraulic fluid sampling taps, specified hydraulic lines, and backhoe valve body group on the booted backhoe, test all hydraulic functions of the backhoe.

1.7.4.2 Performance Test Report

NOTE: *To be generated before Subcontractor shipment to NQA-1 certified Subcontractor.*

The Subcontractor shall submit to the Contractor the in-shop testing results following demonstration of the acceptance criteria.

1.7.5 Special Processes

Not applicable.

1.8 Packaging and Shipping

1.8.1 Packing and Packaging

The Subcontractor shall prepare the CAT 446B backhoe for shipping. As a minimum, the backhoe shall be securely anchored during transport, and the backhoe boom (if present) shall be locked in position and secured.

1.8.2 Marking and Handling

Not applicable.

1.8.3 Special Transportation Requirements

Transportation shall be by truck; rail transportation is not allowed. The Subcontractor shall be responsible for dimensional restrictions, stability, and overall integrity of the equipment during shipment.

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1.9 Installation and Maintenance

1.9.1 Installation

See Contract Drawing 519931 for locations of filter, sampling taps, and accumulator.

See Contract Drawing 519931 for reinstallation and rerouting of hydraulic lines leading from the stabilizer valve group, backhoe valve group, and hydraulic coupler solenoid valve to the backhoe internal boot.

See Contract Drawing 519932 for disconnection of appropriate hydraulic lines and component removal before shipping the backhoe to the NQA-1 certified Subcontractor.

1.9.2 Startup and Calibration

Not applicable.

1.9.3 Training

NOTE: *It is anticipated that the hydraulic fluid sampling device will be simple enough that formal training beyond the instructions provided with the tool will not be required.*

Any required training beyond the instructions provided with the hydraulic fluid sampling kit shall be provided initially by the Subcontractor to an INEEL representative who will then provide training to other INEEL personnel that require training.

1.9.4 Maintenance

Not applicable.

1.10 Marking and Identifications

Not applicable.

1.11 Acceptance

1.11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

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1.11.2 Inspection and Hold Points

The Contractor shall determine inspection and hold points after review of the manufacturing, inspection, and test plan.

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the item(s) will be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

1.11.3 INEEL Surveillance and Audits

The authorized Contractor representative may perform source inspection or surveillance.

1.12 Attachments

Form 431.14, "Vendor Data Schedule."

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431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE
MODIFICATION - PREPARATION FOR BOOT INSTILLATION AND
PREPARATION FOR FIELD USE Project No. 021052 -
22011

System Engineer/
Project Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualificaiton AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	5.4.1		AH. Manufacturing/Inspection/Test Plan	4	BFR - Before Fabrication Release	1. Approval Required
2	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
3	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only
4	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	1. Approval Required
5	6.6.1		AR. Weld Procedure Qualificaiton	4	BFR - Before Fabrication Release	1. Approval Required
6	6.6.2		AS. Welder Performance Personnel Qualifications	4	BFR - Before Fabrication Release	1. Approval Required
7	6.6.3	Non-Destructive Examination Procedures	AZ. Other	4	BFR - Before Fabrication Release	1. Approval Required
8	6.6.3		AT. Non-Destructive Examination Personnel Certifications	4	BFR - Before Fabrication Release	1. Approval Required
9	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
10	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required

- Instructions:
1. Refer to subcontract documents for instructions on submittals.
 2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
 3. The normal number of copies required is ONE. If more are required, the number will be shown here.
 4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

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2. AUTO LUBE SYSTEM

2.1 Summary

2.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd³ of radioactively contaminated waste from OU 7-10 (which comprises Pit 9) at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

The OU 7-10 Glovebox Excavator Method Project incorporates a Retrieval Confinement Structure (RCS) located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. The Packaging Glovebox System (PGS) is attached directly to the RCS and each of the three PGS units is fed by track-guided transfer carts.

A standard CAT 446B backhoe performs soil excavation, probe removal, 55-gal drum removal (using a Jaw bucket design), and core sampling (using a jackhammer and core sampler design). The backhoe cab and loader are located outside the RCS, while the boom, stick, and various end effectors are located inside the contaminated RCS.

The boom cylinders, stick cylinders, and pivot cylinders (all located within the RCS) require periodic greasing. Greasing of these cylinders must be done remotely from outside the RCS to ensure worker safety.

To reach the boom, stick, and pivot cylinder grease points, a combination of hard and flexible lines must be mounted along the boom and stick. These lines shall tie back to progressive metering valves. A single line leading from the metering valves to a central location penetrates the RCS wall through the backhoe boot (see Figure 2-1). Lubrication shall then be supplied through a fully automated system using an electric pump. The system shall be actuated by manual switch located within the backhoe cab.

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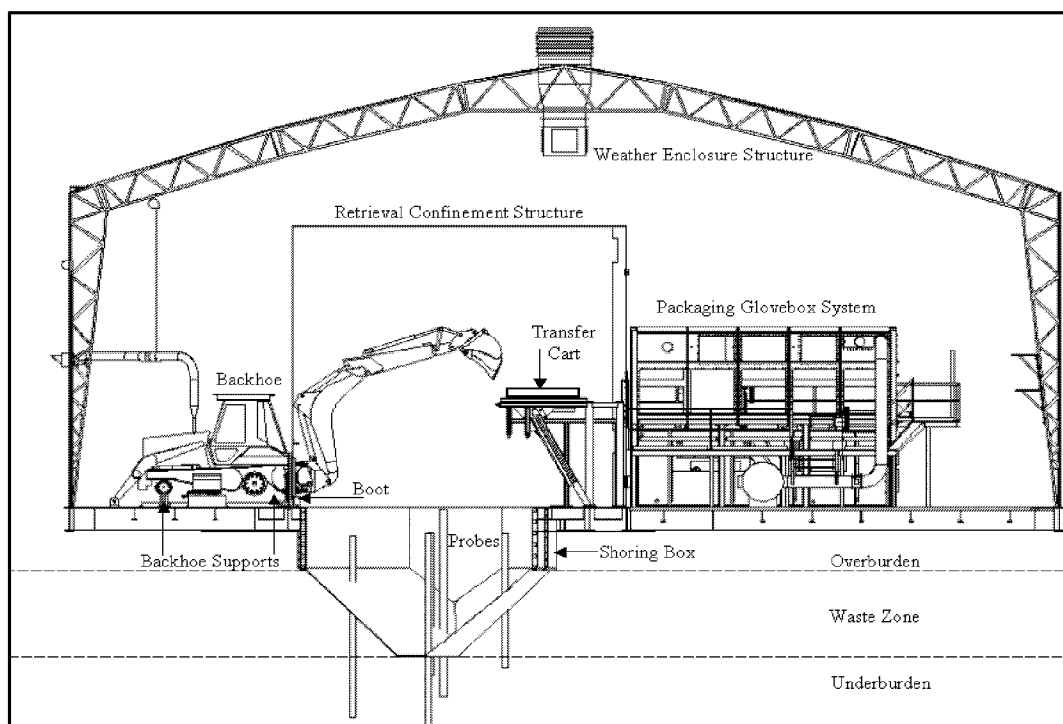


Figure 2-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

2.1.2 Work Included

This specification covers requirements of the Subcontractor and equipment supplier for the design, fabrication, assembly, installation, and testing for the backhoe auto lube system. It is not the intent of this specification to completely define all details of installation. Equipment shall be designed, fabricated, assembled, and installed in accordance with this specification and the standard practices of the equipment supplier and Subcontractor when such practices do not conflict with this specification.

The auto lube system, and all associated hardware, shall be completely assembled and installed into the CAT 446B backhoe at the Subcontractor's facility.

The following shall be delivered to Bechtel BWXT Idaho, LLC:

- A. Complete and fully integrated design of the auto lube system on a CAT 446B backhoe, as shown on Contract Drawing 519931.
- B. Vendor data submittals in accordance with vendor data schedule and this specification.

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2.1.3 Work Not Included

None identified.

2.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

2.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.2.1 National and Local Codes

Occupational Safety and Health Administration

- 29 CFR 1910, "Occupational Safety and Health Standards"

2.2.2 Industry Procedures and DOE Orders

- American Institute of Steel Construction, *Manual of Steel Construction*

American National Standards Institute (ANSI)/American Welding Society (AWS)

- ANSI/AWS A2.4, "Standard Symbols for Welding, Brazing, and Non-Destructive Examination"
- ANSI/AWS D1.1, "Structural Welding Code Steel"
- ANSI/AWS D9.1, "Welding Requirements for Sheet Metal."

2.2.3 Military (National) Specification

Not applicable.

2.2.4 Related Specifications

Not applicable.

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2.2.5 References (such as past designs, drawings, and reports)

Not applicable.

2.3 Technical Requirements

2.3.1 General

The equipment supplier shall design the auto lube system to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the design requirements for the auto lube system.

2.3.1.1 Lubrication Frequency

The auto lube system shall have the capability of greasing all of the grease fittings located within the RCS, with the exception of five bucket curl linkage grease points covered on the equipment and additional modifications of this specification. The Jaw bucket and hammer grease points are not covered under this section.

The auto lube system shall have the capability of manual activation or by electric time clock on a daily basis for a period of 90 days or as recommended by Caterpillar Corporation or the auto lube manufacturer.

2.3.2 Restrictions

None identified.

2.3.3 Performance Requirements

The auto lube system shall be capable of delivering grease to all reasonable lubrication points within the RCS as stated on contract drawings.

The auto lube system shall be operated by an automated programmable lubrication system.

2.3.4 Software

Not applicable

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2.3.5 Registered Professional Engineer Certification

Not applicable.

2.3.6 Human Factors

The design shall use human factor engineering principles and criteria such that all equipment is easily maintainable. The design shall provide access to each system component (located outside of the RCS) for operation, cleaning, and maintenance.

2.3.7 Reliability and Maintainability

2.3.7.1 Reliability

All subcomponents of the auto lube system shall be of a quality that the expected mean time between failure for this system shall not be less than 1,080 hours.

The automated lubrication equipment bearings, fittings, and controls shall be sealed against moisture and damaging particle intrusion using standard industrial components, as practical.

The auto lube system shall employ rugged, industrial off-the-shelf equipment to the maximum extent practical.

The hardware and software of the auto lube system control system shall be based on industry standard components that have been proven in similar systems.

Any plastics or elastomers inside the RCS shall be compatible with a high concentration of volatile carbon tetrachloride.

2.3.7.2 Maintainability

The auto lube system shall be designed and assembled to facilitate ease of inspecting, servicing, and maintaining equipment.

The standard replacement parts of the auto lube system, shown on the manufacturer's recommendations, shall be readily available for routine maintenance activities.

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2.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

None identified.

2.3.9 Natural Phenomena Requirements (such as seismic, wind, and flood)

None identified.

2.4 Environmental, Safety, and Health Requirements

2.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements, as stated in 29 CFR 1910.

2.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

2.4.3 Emergency Response

Not applicable.

2.4.4 Accident Investigation

Not applicable.

2.5 Manufacturing and Assembly

2.5.1 General

The auto lube system shall be assembled and installed onto a CAT 446B backhoe, in the Subcontractor's shop as shown on Contract Drawing 519931, to ensure proper fit and operation. The technical representative (or alternate) of the Contractor (Bechtel BWXT Idaho, LLC) will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor's facility.

2.5.2 Prohibitions

None identified.

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2.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials used within the RCS shall be compatible with volatile carbon tetrachloride. Materials not specified herein shall be of the same quality used for the intended purpose in the equipment manufacturer's standard commercial practice.

2.5.4 Fabrication

Not applicable.

2.5.5 Equipment Tagging

Not applicable.

2.5.6 Cleaning, Painting, and Coating

All automated lubrication equipment shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed. All burrs, castings scars, and sharp edges shall be ground smooth.

Not applicable.

2.5.7 Spare Parts

Cross-reference the applicable standard quality requirements identified in the procurement package.

2.5.8 Other Processes

Not applicable.

2.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

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2.6.1 General Submittal Requirements

2.6.1.1 General Procedures

Vendor data, whether prepared by the Subcontractor or the Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

2.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required; the vendor data schedule may require additional copies. Electronic file submittals are preferred.

2.6.1.3 Form 431.13, "Vendor Data Transmittal and Disposition"

All vendor data shall be submitted to the Contractor using Form 431.13, "Vendor Data Transmittal and Disposition Form." The form provides the Subcontractor a method to submit vendor data and provides the Contractor a means of dispositioning the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), a specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description

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should be complete enough that a person unfamiliar with the project can determine what is included in the submittal.

2.6.1.4 Disposition by the Contractor

The Contractor's comments and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected re-submittal for one of the following reasons:
 - 1. Submittal requires corrections, shown on comments, before final review
 - 2. Submittal data are incomplete and require more detailed information before the final review
 - 3. Submittal data do not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor. Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may

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provide internal review of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

2.6.2 Spare Parts and Special Tools List

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the auto lube system. This list shall include all corresponding suppliers of each component and their phone numbers.

2.6.3 Operating and Maintenance Manuals

The Operations and Maintenance Manual shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for installation shall be included and incorporated in the manual.

2.6.4 Drawings

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the automated lubrication device. These drawings shall document the mechanical, electrical, and instrumentation configuration.

2.6.5 Software

Not applicable.

2.6.6 Inspection Test Plans/Procedures/Reports

This includes the following:

- **Performance test procedures (Subcontractor preshipment):** Performance test plans, procedures, and reports as outlined in Section 2.7.4.1 of this specification.

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- **Performance test reports (Subcontractor preshipment):**
Performance test results and reports as outlined in Section 1.7.4.2.

2.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

2.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled and installed by a manufacturer's representative that has previous related training and experience pertaining to the installation of an automated lubrication system for greasing all appropriate points along the CAT 446 B backhoe boom and stick.

2.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

2.7.3 Nondestructive Examination

Not applicable.

2.7.4 Operational Testing

2.7.4.1 Performance Test Procedures (Subcontractor Preshipment)

The equipment supplier or Subcontractor shall submit to the Contractor an in-shop testing plan and procedure before demonstration of the device. Demonstration shall be performed at the equipment supplier or Subcontractor's facility. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The Subcontractor shall inform the Contractor one week in advance of performance testing so a Contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all equipment operates and interfaces together into a functional automated lubrication system, as defined within this specification.

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Testing acceptance criteria are listed below:

- Test all lubrication points to ensure that ample lubrication of each point has been achieved
- Test all lubrication points to ensure that the lines leading up to each point will not become plugged during operation.

2.7.4.2 Performance Test Report (Subcontractor Preshipment)

The Subcontractor shall submit to the Contractor the in-shop testing results following the demonstration of the capabilities of the automated lubrication device at the facility of the equipment supplier or the Subcontractor.

2.7.5 Special Processes

Not applicable.

2.8 Packaging and Shipping

2.8.1 Packing and Packaging

Not applicable.

2.8.2 Marking and Handling

Not applicable.

2.8.3 Special Transportation Requirements

Not applicable.

2.9 Installation and Maintenance

2.9.1 Installation

The auto lube system shall be installed into the CAT 446B backhoe (that will be used for this project) at the Subcontractor's facility.

2.9.2 Startup and Calibration

Not applicable.

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2.9.3 Training

NOTE: *It is anticipated that the auto lube system will be simple enough that formal training beyond the instructions provided with the tool will not be required.*

The Subcontractor shall provide any required training (beyond the instructions provided for the auto lube system) to an INEEL representative who will then provide training to other INEEL personnel.

2.9.4 Maintenance

The manufacturer of the auto lube system shall provide recommended maintenance instructions for the automated lubrication device and all associated equipment.

2.10 Marking and Identification

Not applicable.

2.11 Acceptance

2.11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

2.11.2 Inspection and Hold Point

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the auto lube system shall be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

2.11.3 INEEL Surveillance and Audits

An authorized Contractor representative may perform service inspection or surveillance.

2.12 Attachments

Form 431.14, "Vendor Data Schedule."

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431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE
MODIFICAITON - AUTO LUBE SYSTEM Project No. 021052 - 21962

System
Engineer/
Project
Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404,
MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualificaiton AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
2	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required
3	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
4	6.3		L. O&M Manual	4	PS - Prior to Shipment	Information Only
5	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	Approval Required
6	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only

Instructions:

1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

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3. BACKHOE FLOW RESTRICTIONS

3.1 Summary

3.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd³ of radioactively contaminated waste from OU 7-10 (which comprises Pit 9) at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

This project incorporates the Retrieval Confinement Structure (RCS) located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The confinement structure is located within a larger fabric-skinned Weather Enclosure Structure. The Packaging Glovebox System (PGS) is attached directly to the RCS and each of the three PGS units is fed by track-guided transfer carts.

A standard Caterpillar Inc. (CAT) 446B backhoe performs soil excavation, probe removal, 55-gal drum removal (using a Jaw bucket design), and core sampling (using a jackhammer and core sampler design). The backhoe cab and loader are located outside the RCS, while the boom, stick, and various end effectors are located inside the contaminated RCS (see Figure 3-1).

Maintaining a slow, gradual movement of the boom and stick within the RCS is of paramount concern. It is imperative to decrease speed at which the boom is lowered and raised. If the backhoe bucket was positioned above or below the transfer cart frame, a sudden vertical movement of the boom could be catastrophic. In addition, the hydraulic lines are at risk of becoming snagged and dislodged on the upright probes when digging around ground probes. Decreasing the velocity at which the boom can be lowered decreases the risk of inadvertently rupturing a hydraulic line on a ground probe. Decreasing the speed at which the stick can be lowered and raised also decreases the risk of the previously mentioned accident scenarios. Reducing the speed at which the extendable stick is extended and contracted is not necessary because of its inherent slow speed of travel.

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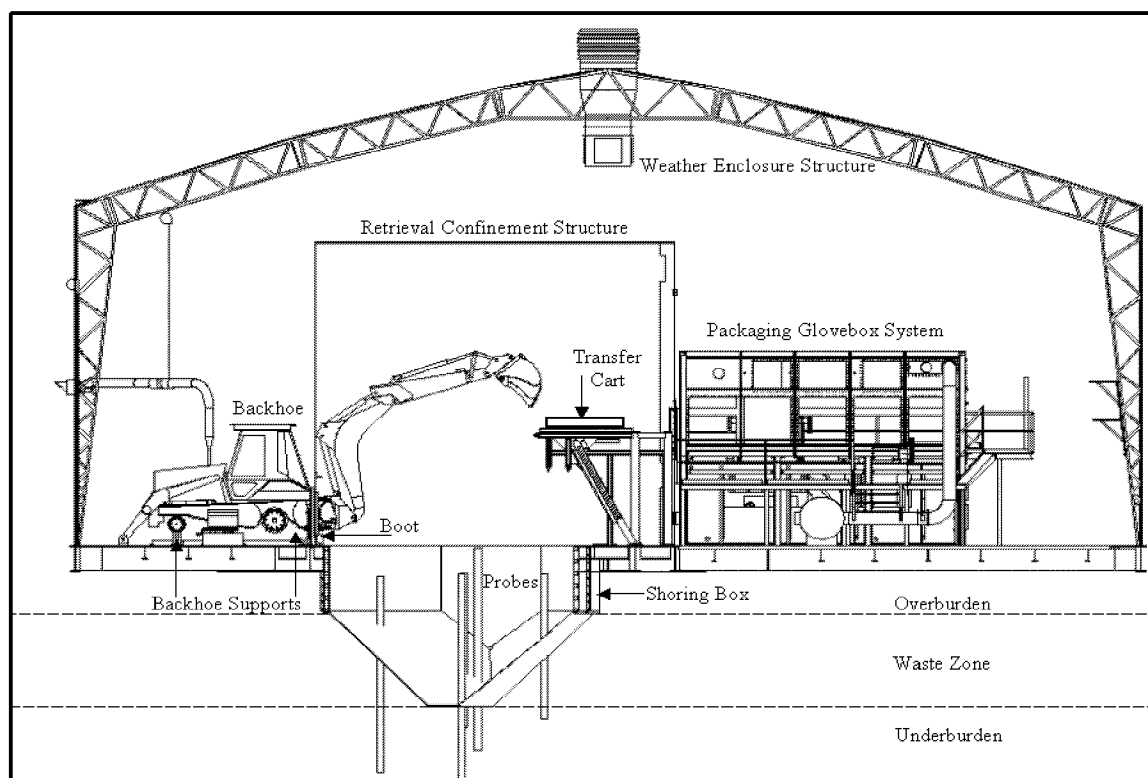


Figure 3-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

Reducing the speed at which the boom can swing the full 180 degrees (right and left) is also of high concern. Excavation of the pit around ground probes requires a high degree of finesse. Reducing the boom swing speed decreases the risk of inadvertently impacting a probe with the side of the bucket. In addition, reducing the boom swing speed reduces the risk of impacting the transfer cart frame, the gloveport station within the RCS wall to the left of the operator, and the RCS wall to the right of the operator.

While it is imperative to reduce the boom and stick speed, it is equally as imperative to maintain a rapid bucket-uncurl speed. The bucket will be used in the excavation of various types of sludge. It may become necessary to rapidly uncurl the bucket over a transfer cart in an effort to release high-viscosity sludge from the bucket. Although the bucket uncurl speed shall be left unmodified, the bucket curl speed shall be reduced to provide a higher degree of bucket dexterity and to prevent the weight of the combined Jaw bucket and coupler from pushing the return hydraulic fluid (from the bucket curl cylinder) back to the tank faster than the pump can supply fluid to the bucket curl cylinder.

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Reduction of the hydraulic fluid flow to and from the backhoe auxiliary lines is necessary because of the H45S hydraulic hammer having an acceptable hydraulic fluid flow of 5 to 13 gal/minute and the Jaw bucket having an acceptable hydraulic fluid flow of 15 to 20 gal/minute. By limiting the auxiliary hydraulic flow rate between 14.5 and 15 gal/minute, the Jaw bucket opens and closes at a slower rate and the hammer operates at a slightly faster rate.

Physical stops within the valve body, referred to in this specification as C.V. shims, shall be placed within the stabilizer valve bodies to limit hydraulic fluid flow to the auxiliary lines and swing cylinders. The C.V. shims limit the spool travel within the valve body, thereby restricting the hydraulic fluid flow while maintaining full system pressure. By reducing the hydraulic fluid flow to the auxiliary lines and swing cylinders, the cycle times (time required to fully extend or retract the appropriate cylinder) are increased. Therefore, the swing cylinder travel speed is reduced to a specified cycle time and the Jaw bucket and hammer flow rates are reduced to within the operating parameters.

Lock check valves, discussed in another specification within this specification package, are placed within the boom, stick, and bucket curl hydraulic lines. These check valves have the capability of reducing the hydraulic flow to within specified parameters. To reduce the speed of the boom, stick, and bucket curl, the locking check valves shall have orifice chokes installed to provide the appropriate flows and cylinder cycle times.

3.1.2 Work Included

It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and the standard practices of the equipment supplier and Subcontractor when such practices do not conflict with this specification.

The C.V. shims, and all associated hardware, shall be completely assembled and installed into the CAT 446B backhoe at the Subcontractor's facility.

The following shall be delivered to the INEEL:

1. A complete and fully integrated system of C.V. shims within the swing cylinder valve in the stabilizer valve group to provide

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hydraulic fluid flow and cycle times, as shown on Table 3-1 and Contract Drawing 519931

2. A complete and fully integrated system of the C.V. shims within the auxiliary valve in the stabilizer valve group to provide hydraulic fluid flow, as shown on Table 3-1 and Contract Drawing 519931
3. Orifice for the stick cylinder lock check valve to provide hydraulic fluid flow and cycle times, as shown on Table 3-1 and Contract Drawing 519931
4. Orifice for the boom cylinder lock check valve to provide hydraulic fluid flow and cycle times, as shown on Table 3-1 and Contract Drawing 519931
5. Orifice for the bucket curl cylinder lock check valve to provide hydraulic fluid flow and cycle times, as shown on Table 3-1 and Contract Drawing 519931
6. Vendor data submittals in accordance with vendor data schedule and this specification.

Table 3-1. Maximum allowable speed with C.V. shims and check valve orifices in place.

Backhoe Movement ^a	Hydraulic Fluid Flow Rate (gallons per minute)	Cycle Time (seconds)
Boom lift (ground-to-stop)	11.5 to 12.5 ^b	5 to 5.5
Stick full curl (stop-to-stop)	14.5 to 15.5 ^b	10 to 10.5
Bucket uncurl (stop-to-stop)	16.25 to 17.25 ^b	2.5 to 3.5
Auxiliary valve	14.5 to 15	—
Boom swing (stop-to-snubber: approximately 180 degrees)	8.5 to 9.5 ^b	7 to 7.5

a. Backhoe movement defined in service manual.
b. Estimated flow rate.

3.1.3 Work Not Included

Not applicable.

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3.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

3.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

3.2.1 National and Local Codes

Occupational Safety and Health Administration

- 29 CFR 1910, "Occupational Safety and Health Standards."

3.2.2 Industry Procedures and DOE Orders

Not applicable.

3.2.3 Military (National) Specification

Not applicable.

3.2.4 Related Specifications

Not applicable.

3.2.5 References (such as past designs, drawings, and reports)

Not applicable.

3.3 Technical Requirements

3.3.1 General

The C.V. shims shall be designed by the equipment supplier and installed by the Subcontractor to provide for a fully functional system and to perform as specified and in a safe and efficient manner.

The locking check valves shall have orifice chokes installed by the Subcontractor to provide for a fully functional system and to perform as specified and in a safe and efficient manner.

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3.3.2 Restrictions

None identified.

3.3.3 Performance Requirements

See Table 3-1.

3.3.4 Software

Not applicable.

3.3.5 Registered Professional Engineer Certification

Not applicable.

3.3.6 Human Factors

Not applicable.

3.3.7 Reliability and Maintainability

3.3.7.1 Reliability

All subcomponents of the C.V. shims and orifices shall be of a quality that the expected mean time between failures for this system shall not be less than 1,080 hours.

The C.V. shims and orifices shall employ rugged, industrial off-the-shelf equipment to the maximum extent practical.

3.3.7.2 Maintainability

None identified.

3.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

3.3.9 Natural Phenomena Requirements

Not applicable.

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3.4 Environmental, Safety, and Health Requirements

3.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements, as stated in 29 CFR 1910.

3.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

3.4.3 Emergency Response

Not applicable.

3.4.4 Accident Investigation

Not applicable.

3.5 Manufacturing and Assembly

3.5.1 General

The C.V. shims and orifices shall be assembled and installed within the lock check valves and stabilizer control valves on a CAT 446B backhoe, in the Subcontractor's shop, to ensure proper fit and operation. The technical representative (or alternate) of the Contractor (Bechtel BWXT Idaho, LLC) will inspect and witness the speed or flow measurements of the assembled final product.

3.5.2 Prohibitions

None identified.

3.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly.

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3.5.4 Fabrication

Not applicable.

3.5.5 Equipment Tagging

Not applicable.

3.5.6 Cleaning, Painting, and Coating

Not applicable.

3.5.7 Spare Parts

Applicable standard quality requirements identified in the procurement package will be cross referenced.

3.5.8 Other Processes

Not applicable.

3.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

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3.6.1.1 General Procedures

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Each submittal shall contain identification for each separable and separate piece of material or equipment and

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literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

3.6.1.2 Vendor Data Schedule

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3.6.1.4 Disposition by the Contractor

Comments from the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

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- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
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 - 3. Submittal data do not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor. Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may provide internal review of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

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The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

3.6.2 Spare Parts and Special Tools List

Not applicable.

3.6.3 Operating and Maintenance Manuals

Not applicable.

3.6.4 Drawings

Not applicable.

3.6.5 Software

Not applicable.

3.6.6 Weld Requirements

Not applicable.

3.6.7 Inspection Test Plans/Procedures/Reports

This includes the following:

- **Performance test procedures (Subcontractor preshipment):**
Performance test plans, procedures, and reports as outlined in Section 3.7.4.1.
- **Performance test reports (Subcontractor preshipment):**
Performance test results and reports as outlined in Section 3.7.4.2.

3.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

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3.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The C.V. shims shall be assembled and installed by a firm that has previous related experience pertaining to installation of C.V. shims into the stabilizer valve body on a CAT 446B backhoe.

The orifices shall be installed by a firm that has previous related experience pertaining to installation of orifices into locking check valves on a CAT 446B backhoe.

3.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

3.7.3 Nondestructive Examination

Not applicable.

3.7.4 Operational Testing

3.7.4.1 Performance Test Procedures (Subcontractor Preshipment)

The equipment supplier or Subcontractor shall submit to the Contractor an in-shop testing plan and procedure before demonstration of the device. Demonstration shall be performed at the facility of the equipment supplier or Subcontractor. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The Subcontractor shall inform the Contractor one week in advance of performance testing so a Contractor representative may be present during the testing process.

Testing acceptance criteria:

- Demonstrate cycle time compliance (provided on Table 3-1) of boom lift from ground to stop
- Demonstrate cycle time compliance (provided on Table 3-1) of stick full curl from stop to stop

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- Demonstrate cycle time compliance (provided on Table 3-1) of boom swing from stop to snubber
- Demonstrate cycle time compliance (provided on Table 3-1) of bucket uncurl from stop to stop
- Demonstrate flow rate compliance (provided on Table 3-1) of the auxiliary valve.

3.7.4.2 Performance Test Report (Subcontractor Preshipment)

The Subcontractor shall submit to the Contractor the in-shop testing results following the demonstration.

3.7.5 Special Processes

Not applicable.

3.8 Packaging and Shipping

3.8.1 Packing and Packaging

Not applicable.

3.8.2 Marking and Handling

Not applicable.

3.8.3 Special Transportation Requirements

Not applicable.

3.9 Installation and Maintenance

3.9.1 Installation

The C.V. shims shall be installed into the backhoe stabilizer control valves within the CAT 446B backhoe at the Subcontractor's facility.

Orifices shall be installed into the backhoe locking check valves mounted to the CAT 446B backhoe at the Subcontractor's facility.

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3.9.2 Startup and Calibration

The supplier or Subcontractor shall ensure that the C.V. shims and orifices provide accurate boom cylinder, stick cylinder, bucket cylinder, and swing cylinder cycle times and auxiliary valve flow rate.

3.9.3 Training

NOTE: *It is anticipated that formal training beyond the instructions provided with the backhoe will not be required.*

The Subcontractor shall initially provide any required training to an INEEL representative who will then provide training to other INEEL personnel, as required.

3.9.4 Maintenance

Not applicable.

3.10 Marking and Identification

Not applicable.

3.11 Acceptance

3.11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

3.11.2 Inspection and Hold Points

Not applicable.

3.11.3 INEEL Surveillance and Audits

The authorized Contractor representative may perform source inspection or surveillance.

3.12 Attachments

Form 431.14, "Vendor Data Schedule."

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431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - BACKHOE FLOW RESTRICTIONS Project No. 021052 - 21991

System Engineer/Project Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

Specification Environmental Restoration	BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT	Identifier: SPC-401 Revision: 1 Page: 3-16 of 3-16
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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
2	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

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4. BOOM CYLINDER MODIFICATION

4.1 SUMMARY

4.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd³ of radioactively contaminated waste from OU 7-10 (which comprises Pit 9) at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

This project incorporates a Retrieval Confinement Structure (RCS) located over an excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. The Packaging Glovebox System (PGS) is attached directly to the RCS and each of the three PGS units is fed by track-guided transfer carts.

A standard CAT 446B backhoe performs soil excavation, probe removal, 55-gal drum removal, and core sampling. The backhoe cab and loader are located outside the RCS, while the boom, stick, and various end effectors are located inside the contaminated RCS.

A flat outer boot separates the backhoe operator from the RCS, as shown in Figure 4-1. This outer boot is located between the operator cab and the boom pivot point. The backhoe boom is designed to crowd against the operator window during transport. Because of this design feature, the operator window, located directly over the backhoe boot, can be penetrated by the boom cylinder support (see Figure 4-2).

To prevent the boom from retracting to a collision point, the boom cylinder (cylinder that raises and lowers the boom) shall be modified with a longer cylinder rod. The longer cylinder rod shall prevent the boom from penetrating the operator window. In addition, the snubber system of the internal cylinder shall slow the progress of the boom near the window.

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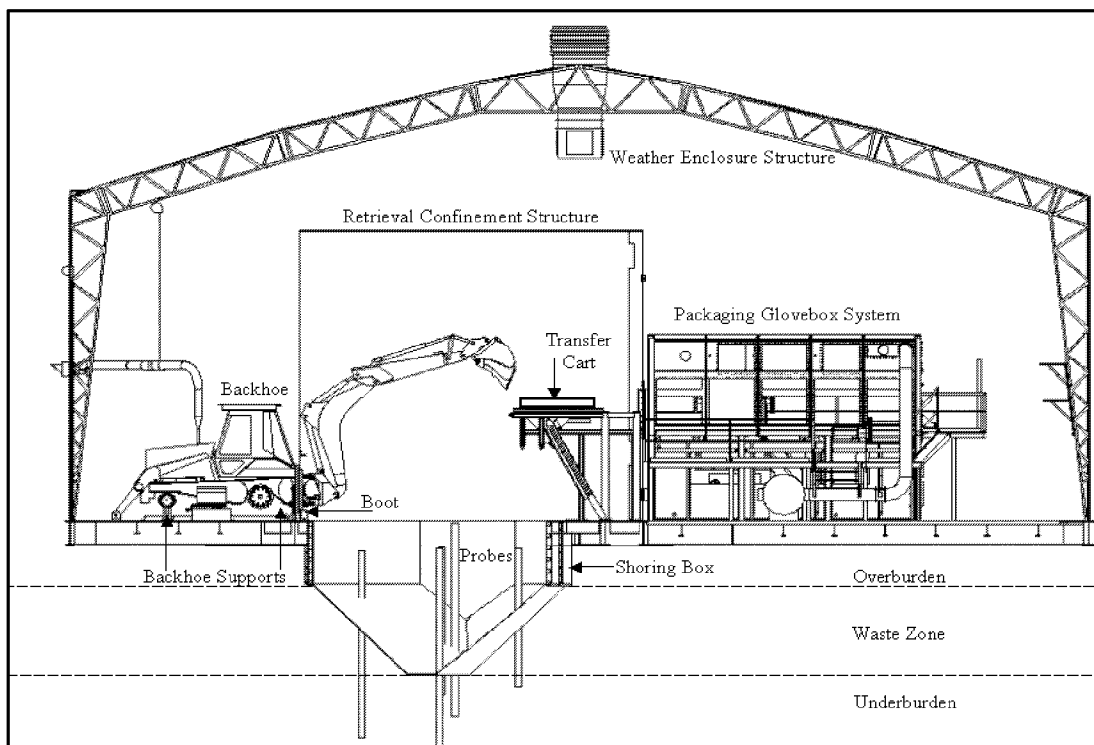


Figure 4-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

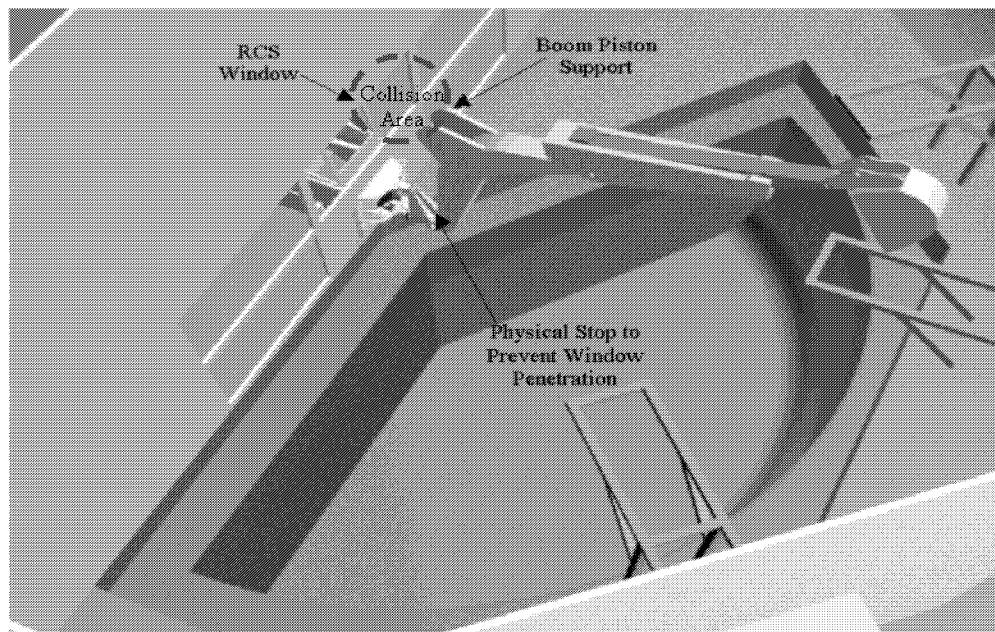


Figure 4-2. Collision area (red circle) showing the Retrieval Confinement Structure window penetration by boom cylinder support.

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4.1.2 Work Included

It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and standard practices of the equipment supplier and Subcontractor when such practices do not conflict with this specification.

The lengthened cylinder rod and all associated hardware shall be completely assembled and installed into the CAT 446B backhoe at the Subcontractor's facility.

The following items shall be delivered to INEEL:

- A complete and fully integrated boom cylinder system on a CAT 446B backhoe
- Vendor data submittals in accordance with the vendor data schedule and this specification.

4.1.3 Work Not Included

Not applicable.

4.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

4.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

4.2.1 National and Local Codes

Occupational Safety and Health Administration

- 29 CFR 1910, "Occupational Safety and Health Standards"

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4.2.2 Industry Procedures and DOE Orders

- American Institute of Steel Construction, *Manual of Steel Construction*

American Society of Testing and Materials (ASTM)

- ASTM A36, "Standard Specification for Carbon Structural Steel"
- ASTM A108, "Standards Specification for Steel Bars, Carbon, Cold Finished Standard Quality"
- ASTM A570, "Standard Specification for Structural Steel, Sheet and Strip, Carbon, Hot-Rolled"
- ASTM A325, "Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength"

American Society of Nondestructive Testing (ASNT)

- ASNT SNT-TC-1A, "Qualification and Certification of Nondestructive Personnel"

Society of Automotive Engineers (SAE)

- SAE J31, "Hydraulic Backhoe Lift Capacity"
- SAE J1097, "Hydraulic Excavator Lift Capacity Calculation and Test Procedure"

The following SAE specifications are for reference only, not as requirements:

- SAE J1177, "Hydraulic Excavator Operator Controls, Recommended Practices"
- SAE J1179, "Hydraulic Excavator Digging Forces, Recommended Practices"
- SAE J1336, "Hydraulic Cylinder Leakage Test"

American Iron and Steel Institute (AISI)

- AISI 10xx, "Carbon Steels"

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American National Standards Institute (ANSI)/American Welding Society (AWS)

- ANSI/AWS A2.4, “Standard Symbols for Welding, Brazing, and Non-Destructive Examination”
- ANSI/AWS D1.1, “Structural Welding Code Steel. ”

4.2.3 Military (National) Specification

Not applicable.

4.2.4 Related Specifications

Not applicable.

4.2.5 References (such as past designs, drawings, and reports)

Not applicable.

4.3 Technical Requirements

4.3.1 General

The equipment supplier or Subcontractor shall fabricate and install a modified boom cylinder to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the operating requirements for the modified boom cylinder.

4.3.1.1 Limitation on Boom Raise and Lower

A flat outer boot separates the backhoe operator from the RCS. This outer boot is located between the operator cab and the swing frame pin location to the backhoe frame. The backhoe boom is designed to crowd against the operator window during transport. Because of this design feature, the operator window, which is located directly over the backhoe boot, can be penetrated by the standard boom cylinder length (see Figure 4-2).

To prevent the boom from retracting to a collision point, the boom cylinder rod (that raises and lowers the boom) shall be replaced with a longer cylinder rod. The longer cylinder rod shall prevent the boom from penetrating the RCS window.

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The new boom cylinder rod shall be lengthened to prevent any part of the boom from extending 6 in. past the swing frame pivot pin in the direction of the backhoe cab, as shown in Figure 4-3.

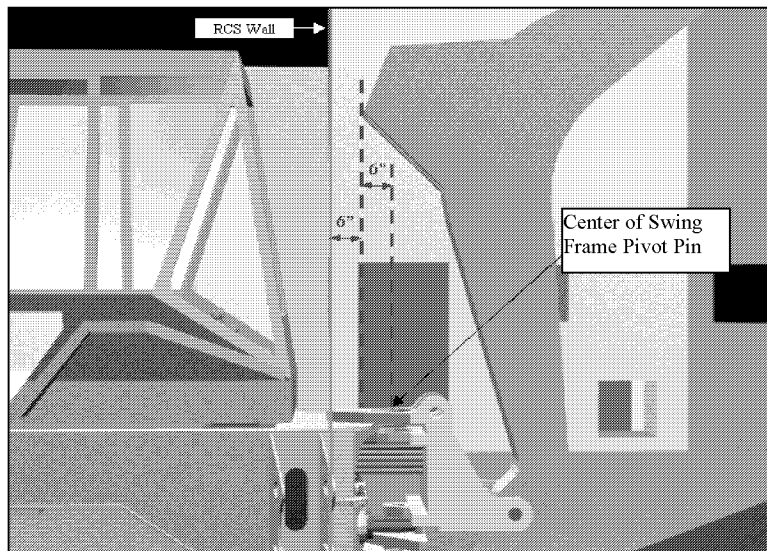


Figure 4-3. Limitation on boom raise and lower.

4.3.2 Restrictions

The new boom cylinder rod shall be fabricated from standard hydraulic cylinder rod stock, AISI 1045 or 1050 material.

4.3.3 Performance Requirements

The modified boom cylinder shall be capable of stopping any part of the boom extending 6 in. past the swing frame pivot pin in the direction of the backhoe cab, as shown in Figure 4-3.

The internal snubber shall be functional and shall prevent an impact of the backhoe arm when fully raised.

4.3.4 Software

Not applicable.

4.3.5 Registered Professional Engineer Certification

Not applicable.

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4.3.6 Human Factors

Not applicable.

4.3.7 Reliability and Maintainability

All subcomponents of the modified boom cylinder rod shall be of a quality that the expected mean time between failures for this system shall not be less than 1,080 hours.

4.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

4.3.9 Natural Phenomena Requirements (such as seismic, wind, and flood)

Not applicable.

4.4 Environmental, Safety, and Health Requirements

4.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements, as stated in 29 CFR 1910.

4.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

4.4.3 Emergency Response

Not applicable.

4.4.4 Accident Investigation

Not applicable.

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4.5 Manufacturing and Assembly

4.5.1 General

The modified boom cylinder shall be installed onto a CAT 446B backhoe, in the Subcontractor's shop, to ensure proper fit and operation. The technical representative (or alternate) from the Contractor (Bechtel BWXT Idaho, LLC) will inspect the fabrication process and assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor's facility.

A manufacturing inspection test plan shall be submitted to the Contractor before release for fabrication. The plan shall detail the fabrication, assembly, installation, inspection, examination, and test process to be performed. The plan shall be submitted for approval before supplier initiation of any manufacturing, inspection, or test activities, for incorporation of Contractor source inspection hold points.

4.5.2 Prohibitions

None identified.

4.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in the equipment manufacturer's standard commercial practice.

4.5.4 Fabrication

4.5.4.1 Welding

Welding shall be performed in accordance with the subcontract. All welding shall be performed in accordance with AWS D 1.1 for statically loaded nontubular structures. Welders and weld procedures shall be qualified in accordance with AWS D 1.1 for statically loaded nontubular structures. Weld procedures, welder qualifications, nondestructive testing procedures, and nondestructive testing personnel qualifications shall be submitted to the Contractor for approval before performing any welding. Wherever stress relieving is required to maintain

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dimensional requirements, it shall be done before machining. Finished weld surfaces shall be free of defects. Welds being ground must be kept cool at all times to minimize distortion and discoloration. The original material thickness shall be maintained after all grinding and polishing processes.

4.5.4.2 Finish and Fit

The fit and finish of the modified cylinder rod shall be identical or better than the cylinder rod it replaces.

All mill and fabrication markings must be removed (i.e., center punch marks, scribe lines, and stampings). All exposed surfaces shall be free of sharp edges, cracks, pits, oxides, embedded slag, burns, weld splatter, sharp ridges, grooves, tool marks, or any other surface irregularities. All parts shall be free of burrs and sharp edges. All components drilled or machined shall be deburred and cleaned after the work has been completed. All fits shall be made without using shims unless specified on the drawings and where fit can be made without stressing or forcing components or materials beyond where such force fit is specified.

4.5.5 Equipment Tagging

Not applicable.

4.5.6 Cleaning, Painting, and Coating

The modified boom cylinder shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed. All burrs, castings scars, and sharp edges shall be ground smooth.

4.5.7 Spare Parts

Not applicable.

4.5.8 Other Processes

Not applicable.

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4.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

4.6.1 General Submittal Requirements

4.6.1.1 General Procedures

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

4.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, specification reference, and description of the item or service. The type of submittal is identified by a vendor data code, and the time required to submit the item is identified by a when to submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required; the vendor data schedule may require additional copies. Electronic file submittals are preferred.

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4.6.1.3 Form 431.13, “Vendor Data Transmittal and Disposition Form”

All vendor data shall be submitted to the Contractor using the Form 431.13, “Vendor Data Transmittal and Disposition Form.” The form provides the Subcontractor with a method to submit vendor data and provides the Contractor a means of dispositioning the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what is included in the submittal.

4.6.1.4 Disposition by the Contractor

Comments by the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. Work May Proceed: Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal: This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. Work May NOT Proceed. Revise and Resubmit: Submittals so dispositioned will require a corrected re-submittal for one of the following reasons:
 - 1. Submittal requires corrections, shown on comments, before final review
 - 2. Submittal data are incomplete and require more detailed information before the final review

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3. Submittal data do not meet subcontract document requirements.

D. **Accepted for Use. Information Only Submittal:**
Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor. Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may provide internal review of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

4.6.2 Spare Parts and Special Tools List

Not applicable.

4.6.3 Operations and Maintenance Manuals

Not applicable.

4.6.4 Drawings

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the modified boom cylinder. These drawings shall document the mechanical configuration.

4.6.5 Software

Not applicable.

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4.6.6 Weld History

4.6.6.1 Weld Procedures

Welding procedures shall be in accordance with AWS D 1.1 for statically loaded nontubular structures. A copy of the weld procedures to be used in this work shall be submitted to INEEL for approval before fabrication.

4.6.6.2 Weld Map

A weld map shall be submitted to the Contractor and shall include the following information: weld procedure specification, nondestructive examination requirements and unique identification number including welder's identification, completion date, and reference to inspection report.

4.6.6.3 Welder Qualifications

All welder qualifications and qualification procedures shall be in accordance with AWS D 1.1 for statically loaded nontubular structures. Copies of welder qualifications shall be submitted to INEEL for approval before fabrication.

4.6.6.4 Nondestructive Examination Procedures and Qualifications

Liquid penetrant testing, radiographs, and inspections shall be performed in accordance with Section 4.7.3. All nondestructive examination procedures and inspector qualifications shall be submitted to the INEEL for approval before fabrication.

4.6.7 Inspection Test Plans, Procedures, and Reports

This includes the following:

- **Performance test procedures (Subcontractor preshipment):**
Performance test plans, procedures, and reports as outlined in Section 4.7.4.1.
- **Performance test reports (Subcontractor preshipment):**
Performance test results and reports as outlined in Section 4.7.4.2.

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4.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

4.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled, modified, and installed by a firm that has prior related experience pertaining to repair and fabrication of hydraulic cylinder rods and installing hydraulic cylinder rods within earth moving equipment.

4.7.2 QA Program

The Subcontractor is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

4.7.3 Nondestructive Examination

4.7.3.1 Weld Inspections and Examinations

Visual examination shall be performed for workmanship and all materials and components of the structure, as specified in this specification.

Visual examination of welding shall be performed in accordance with AWS D 1.1 for statically loaded nontubular structures. Personnel performing visual examination of welds shall meet the requirements of AWS D 1.1.

4.7.4 Operational Testing

4.7.4.1 Performance Test Procedures (Subcontractor Preshipment)

The equipment supplier or Subcontractor shall submit to the Contractor an in-shop testing plan and procedure before demonstration of the capabilities of the modified boom cylinder at stopping the boom at the predetermined location. Tests shall be performed at the facility of the equipment supplier or Subcontractor. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

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The Subcontractor shall inform the Contractor one week in advance of performance testing so a Contractor representative may be present during the testing process.

Subcontractor testing should demonstrate that all equipment operates and interfaces together into a functional boom system, as defined within this specification.

Testing acceptance criteria:

- Confirm that fully retracted boom shall not penetrate the RCS window.

4.7.4.2 Performance Test Report (Subcontractor Preshipment)

The Subcontractor shall submit to the Contractor the in-shop testing results following the demonstration of the modified boom cylinder capabilities at stopping the boom at the predetermined location.

4.7.5 Special Processes

Not applicable.

4.8 Packaging and Shipping

4.8.1 Packing and Packaging

Not applicable.

4.8.2 Marking and Handling

Not applicable.

4.8.3 Special Transportation Requirements

Not applicable.

4.9 Installation and Maintenance

4.9.1 Installation

The modified boom cylinder to be used for this project shall be installed in the CAT 446B backhoe at the Subcontractor's facility.

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4.9.2 Startup and Calibration

Not applicable.

4.9.3 Training

Not applicable.

4.9.4 Maintenance

Not applicable.

4.10 Marking and Identification

Not applicable.

4.11 Acceptance

4.11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

4.11.2 Inspection and Hold Points

The Contractor shall determine inspection and hold points after review of the manufacturing, inspection, and test plan.

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the boom cylinder will be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

4.11.3 INEEL Surveillance and Audits

The authorized Contractor representative may perform source inspection or surveillance.

4.12 Attachments

Form 431.14, "Vendor Data Schedule."

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431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - BOOM CYLINDER MODIFICATION Project No. 021052 - 21968

System Engineer/Project Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	5.1		AH. Manufacturing/Inspection/Test Plan	4	BFR - Before Fabrication Release	Approval Required
2	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	Approval Required
3	6.6.1		AR. Weld Procedure Qualificaiton	4	BFR - Before Fabrication Release	Approval Required
4	6.6.2	Weld Map	AZ. Other	4	PS - Prior to Shipment	1. Approval Required
5	6.6.3		AS. Welder Performance Personnel Qualifications	4	BFR - Before Fabrication Release	Approval Required
6	6.6.4		AT. Non-Destructive Examination Personnel Certifications	4	BFR - Before Fabrication Release	Approval Required
7	6.6.4	Non-Destructive Examination Procedures	AZ. Other	4	BFR - Before Fabrication Release	Approval Required
8	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
9	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

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5. DRUM WEIGHING SYSTEM

5.1 Summary

5.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 yd³ of radioactively contaminated waste from OU 7-10 (which comprises Pit 9) at the Subsurface Disposal Area within the Radioactive Waste Management Complex at the Idaho National Engineering and Environmental Laboratory (INEEL) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure (RCS) wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the RCS.

This incorporates an RCS located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. The Packaging Glovebox System (PGS) is attached directly to the confinement structure and is fed by track-guided transfer carts, as shown in Figure 5-1.

A standard CAT 446B backhoe performs the following tasks:

- Excavation of soil
- Removal of probes
- Removal of 55-gal drums (using a Jaw bucket design)
- Performing core sampling.

The backhoe cab and loader are located outside the RCS while the boom, stick, and various end effectors are located inside the contaminated RCS.

Retrieval of several waste drums containing combustibles, noncombustibles, sludge, and graphite is expected during excavation of the pit. The weight of these drums range from an empty drum up to 507-lb drums containing Series 743 sludge. Drums weighing over 350 lb are prohibited in the PGS because of safety concerns. To prevent a drum weighing more than 350 lb from entering the PGS, the weight of each drum will be monitored before loading the PGS transfer carts. In an

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effort to reduce downtime, each drum will be weighed using a calibrated precision mechanical pressure gauge mounted in the backhoe cab. This pressure gauge will be supplied as government-furnished equipment to the Subcontractor by INEEL.

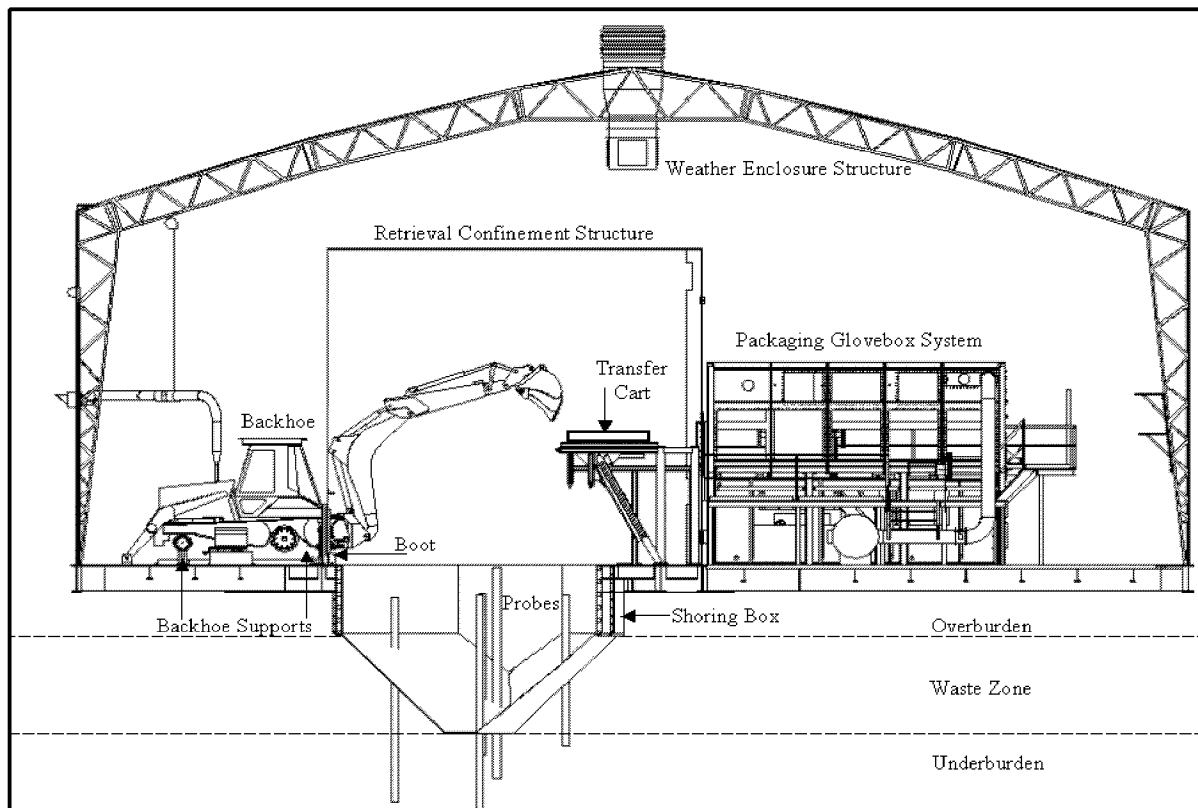


Figure 5-1. Cross section of the OU 7-10 Glovebox Excavator Method Project facility.

The pressure gauge shall meet the following criteria:

- Heise 4000 CMM 6-in. pressure gauge (or equivalent)
- Range 0 to 4,000 psig
- 1/4-in. female national pipe thread bottom port
- 403 stainless steel
- Temperature compensated.

This pressure gauge shall be connected to the hydraulic line leading from the backhoe control valve to the rod side of the stick cylinder as shown

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on Contract Drawing 519931, "OU 7-10 Glovebox Excavator Method Project Excavator Modifications WSE (Western States Equipment) Modifications."

To weigh a drum, the backhoe grapples a drum on its ends with the jaws of the Jaw bucket, positions the bucket at a predetermined angle, and slowly raises the stick to the horizontal position and stops the motion at horizontal. The operator reads the hydraulic pressure on the rod side of the stick cylinder and determines the drum weight from a table that lists pressure versus drum weight. If the pressure is in excess of a corresponding drum weight of 350 lb, the drum is kept in the pit and a drum-sizing tray may be used to size it into manageable pieces.

5.1.2 Work Included

It is not the intent of this specification to define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and standard practices of the Subcontractor when such practices do not conflict with this specification.

The drum weighing system and all associated hardware shall be completely assembled and installed into the CAT 446B backhoe at the Subcontractor's facility.

The following shall be delivered to the INEEL:

1. A complete and fully integrated design of the drum weighing system on a CAT 446B backhoe as shown on Contract Drawing 519931
2. Vendor data submittals in accordance with vendor data schedule and this specification
3. The final installation of all components of this system shall not occur until the backhoe is returned to the Subcontractor from the Nuclear Quality Assurance-1 Subcontractor (see the "Preparation for Boot Installation and Preparation for Field Use" section of this specification).

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5.1.3 Work Not Included

The following actions shall not be included in the scope of work of the Subcontractor:

- Procurement of the Heise pressure gauge (the gauge will be provided as government-furnished equipment by the INEEL)
- Calibration of the drum weighing system.

5.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader and the Heise pressure gauge to the Subcontractor.

5.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

5.2.1 National and Local Codes

Occupational Safety and Health Administration (OSHA)

- 29 CFR 1910, "Occupational Safety and Health Administration"

5.2.2 Industry Procedures and DOE Orders

American Society of Testing and Materials (ASTM)

- ASTM A108-99, "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality"
- ASTM A576-90B, "Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality"
- ASTM B117-97, "Standard Practice for Operating Salt Spray (Fog) Apparatus"

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- ASTM A1011/A1011M-02, “Standard Specification for Steel, Sheet and Strip, Hot-Rolled, Carbon, Structural, High-Strength Low-Alloy and High-Strength Low-Alloy with Formability”

Society of Automotive Engineers (SAE)

- SAE J1453, “Fitting - O-Ring Face Seal”
- SAE J514, “Hydraulic Tube Fittings”
- SAE J516, “Hydraulic Hose Fittings”
- SAE J517, “Hydraulic Hose”
- SAE 100R1AT, “Hydraulic Hose”
- SAE 100R12, “Hydraulic Hose”

American National Standards Institute (ANSI)/American Welding Society (AWS)

- ANSI/AWS A2.4, “Standard Symbols for Welding, Brazing, and Non-Destructive Examination”
- ANSI/AWS D9.1, “Welding Requirements for Sheet Metal. ”

5.2.3 Military (National) Specifications

Not applicable.

5.2.4 Related Specifications

Not applicable.

5.2.5 References (such as past designs, drawings, and reports)

Not applicable.

5.3 Technical Requirements

5.3.1 General

The drum weighing system shall be installed as shown on Contract Drawing 519931 to provide for a fully functional system and to perform

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as specified in a safe and efficient manner. This section defines the requirements for the drum weighing system.

- A. The installed pressure gauge shall be a Heise pressure gauge as described in Section 5.1.1 and as provided by the INEEL
- B. The gauge shall be mounted in the operator cab in full view of the operator when operating the backhoe
- C. The system shall have a manual bleed valve if required, a pressure gauge snubber, and a manual shutoff valve located near the gauge in the cab
- D. The gauge shall be connected to the hydraulic line leading from the backhoe control valve to the rod-side of the stick cylinder as shown on Contract Drawing 519931.

5.3.2 Restrictions

The Heise pressure gauge is a precisely calibrated measuring instrument. Care must be taken to avoid dropping or other mistreatment of the gauge before, during, or after gauge installation.

5.3.3 Performance Requirements

The drum weighing system shall be capable of providing the backhoe operator with an analog readout of the static pressure imposed on the rod side of the stick cylinder when stopped after raising the stick to the horizontal position.

5.3.4 Software

Not applicable.

5.3.5 Registered Professional Engineer Certification

Not applicable.

5.3.6 Human Factors

The gauge and manual valves shall be mounted using human factor engineering principles and criteria such that all equipment is easily read and operated.

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5.3.7 Reliability and Maintainability

5.3.7.1 Reliability

All subcomponents of the drum weighing system (except the Heise pressure gauge that will be supplied by INEEL) shall have an expected mean time between failures of not less than 1,080 hours.

The drum weighing systems shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.

The drum weighing system hardware shall be based on industry standard components that have been proven in similar systems.

5.3.7.2 Maintainability

The drum weighing system shall be assembled to facilitate ease of inspecting, servicing, and maintaining equipment.

The drum weighing system standard replacement parts, shown on manufacturer's recommendations, shall be readily available for routine maintenance activities.

5.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

5.3.9 Natural Phenomena Requirements

Not applicable.

5.4 Environmental, Safety, and Health Requirements

5.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable OSHA requirements as stated in 29 CFR 1910.

The Heise pressure gauge has a blowout plug on the back for overload conditions. The location of this blowout plug should be taken into account when locating and mounting the gauge. The pressure line and

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valves leading to the gauge shall be located so as not to impact the operator with hydraulic fluid or components should a hydraulic rupture occur.

5.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

5.4.3 Emergency Response

Not applicable.

5.4.4 Accident Investigation

Not applicable.

5.5 Manufacturing and Assembly

5.5.1 General

The drum weighing system shall be assembled and installed on a CAT 446B backhoe in the Subcontractor's shop to ensure proper fit and operation. The technical representative (or alternate) of the Contractor (Bechtel BWXT Idaho, LLC) will inspect the installation of the Heise pressure gauge and the assembled final product. Assembly of the equipment shall be made in a clean area of the Subcontractor's facility.

5.5.2 Prohibitions

None identified.

5.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials shall be as delineated on contract drawings.

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5.5.4 Fabrication

5.5.4.1 Welding

Welding shall be performed in accordance with the subcontract. All welding shall be performed in accordance with AWS D 9.1. Welders and weld procedures shall be qualified in accordance with AWS D 9.1. Weld procedures, welder qualifications, nondestructive testing procedures, and nondestructive testing personnel qualifications shall be submitted to the Contractor for approval before performing any welding. Wherever stress relieving is required to maintain dimensional requirements, it shall be done before machining. Finished weld surfaces shall be free of defects. Welds being ground must be kept cool at all times to minimize distortion and discoloration. The original material thickness shall be maintained after all grinding and polishing processes.

5.5.5 Equipment Tagging

Not applicable.

5.5.6 Cleaning, Painting, and Coating

5.5.6.1 Cleaning

All surfaces shall be cleaned for removal of weld flux, oil, grease, shop soil, and visible rust. Methods may include cleaning by hot water spray or solvent wiping. The final wash and rinse shall be accomplished with fresh water. Cleanliness shall meet the approval of the Contractor at the time of final inspection.

5.5.6.2 Painting or Coating

- **Surface preparation and painting:** External corrosion-resistant surfaces shall be prepared and coated in accordance with this section. Surfaces to be painted shall be abrasive blast cleaned in accordance with Steel Structures Painting Council (SSPC)-SP6.

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- **Materials:** The coating system shall consist of one prime and two finish coats using the coating systems listed below in Table 5-1, or a Contractor-approved equivalent.

Table 5-1. Coating system prime and finish coat.

Manufacturer	Primer	Finish
Keeler and Long	No.6040 (Tri-Polar Primer)	P-Series (Poly-Silicone Enamel) Copolymerized Silicone-Alkyd Enamel Light Gray 5504

- **Standard components color:** Type of paint and color of final coat shall be in accordance with the Contractor drawings.

One quart of each different color of paint shall be provided for field touch-up.

5.5.7 Spare Parts

The applicable standard quality requirements identified in the procurement package shall be cross referenced.

5.5.8 Other Processes

Not applicable.

5.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. Additional submittal requirements are defined in the vendor data schedule and applicable subcontract documents. The quantities and submittal schedule is included in the attached vendor data schedule.

5.6.1 General Submittal Requirements

5.6.1.1 General Procedures

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the

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submittal itself, meet all the requirements of the subcontract specifications, drawings, or other contract documents.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

5.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, drawing or specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required. Additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

5.6.1.3 Form 431.13, "Construction Vendor Data Transmittal & Disposition Form"

All vendor data shall be submitted to the Contractor using Form 431.13, "Construction Vendor Data Transmittal & Disposition Form." The form provides a method for the Subcontractor to submit vendor data and a means for the Contractor to disposition the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), the drawing or specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

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5.6.1.4 Disposition by the Contractor

Comments by the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
 - (1) Submittal requires corrections, shown on comments, before final review
 - (2) Submittal data incomplete and requires more detailed information before final review
 - (3) Submittal data does not meet subcontract document requirements.
- D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned generally will be classified as information only for as-specified material and equipment.

Vendor data coded as mandatory approval will be reviewed by the Contractor and receive an A, B, or C disposition. Dispositioned submittals coded as A, B, and C will be returned to the Subcontractor.

Information-only submittals without comments will receive a D disposition and will not be returned to the Subcontractor. The Contractor may provide internal review

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of information-only submittals. If comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

5.6.2 Spare Parts and Special Tools List

The Subcontractor shall submit to the Contractor a list of recommended special tools required for maintenance of the drum weighing system. This list shall include all corresponding suppliers of each tool and associated phone numbers.

5.6.3 Operating and Maintenance Manuals

The Subcontractor shall submit the suggested operating instructions to the Contractor for operating the drum weighing system. The operating instructions shall contain the operations that should be performed as a result of knowledge gained from the testing that shall occur in accordance with Section 5.7.4.1 of the drum weighing portion of this specification. Instructions for operating the shutoff and bleed valves, with precautions, shall be included in the operating instructions.

5.6.4 Drawings

The Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the drum weighing system. These drawings shall document the mechanical configuration.

5.6.5 Software

Not applicable.

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5.6.6 Weld Requirements

5.6.6.1 Weld Procedures

Welding procedures shall be in accordance with AWS D 9.1. A copy of the weld procedures to be used in this work shall be submitted to the INEEL for approval before fabrication.

5.6.6.2 Welder Qualifications

All welder qualifications and qualification procedures shall be in accordance with AWS D 9.1. Copies of welder qualifications shall be submitted to INEEL for approval before fabrication.

5.6.6.3 Nondestructive Examination Procedures and Qualifications

Liquid penetrant testing, radiographs, and inspections shall be performed in accordance with Section 5.7.3. All nondestructive examination procedures and inspector qualifications shall be submitted to the INEEL for approval before fabrication.

5.6.7 Inspection Test Plans/Procedures/Reports

Inspection test plans, procedures, and reports include the following:

- **Performance test procedures (Subcontractor preshipment):**
Performance test plans, suggested operating instructions, and reports as outlined in Section 7.4.1 of this specification
- **Performance test reports (Subcontractor preshipment):**
Performance test results and reports as outlined in Section 7.4.3 of this specification.

5.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

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5.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The Heise pressure gauge shall be assembled and installed by a firm that has previous related experience pertaining to rerouting of hydraulic lines and installation of auxiliary equipment within the cab of a CAT 446B.

5.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meets codes and standards identified in this specification.

5.7.3 Nondestructive Examination

5.7.3.1 Weld Inspections and Examinations

Visual examination shall be performed for workmanship and all materials and components of the structure, as specified in this specification.

Visual examination of welding shall be performed in accordance with AWS D 9.1. Visual acceptance criteria shall be in accordance with AWS D9.1, Section 6. Exception is no visible pores.

5.7.4 Operational Testing

5.7.4.1 Performance Test Procedures

The Subcontractor shall submit a test procedure to the Contractor before demonstration of the drum weighing system at the Subcontractor's facility. The procedure shall include the testing date, conditions, duration, sequence, materials used, and methods of performing the tests.

The procedure shall include lifting and weighing drums from 100 to 500 lb in increments of 100 lb. The drums shall be grasped with the Jaw bucket, which shall be held in a predetermined and repeatable orientation. The stick extension shall be fully retracted and the stick shall be raised slowly and stopped and held in the horizontal position. Then the pressure reading of the Heise pressure gauge corresponding to the drum weight shall be recorded. The stick shall be lowered and raised to the horizontal

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position three times with the same drum weight to determine hysteresis errors in the pressure reading.

The Subcontractor shall inform the Contractor one week in advance of performance testing so that a Contractor representative may be present during the testing process.

Subcontractor testing shall demonstrate that all equipment operates and interfaces together into a functional drum weighing system as defined in this specification.

5.7.4.2 Testing Acceptance Criteria

- Records of pressure versus drum weight are provided for all 15 runs of the weighing procedure
- Hydraulics are installed to read the pressure in the rod-side of the stick cylinder
- Shutoff valve isolates the gauge from the pressure source
- Bleed valve operates as intended
- Leakage from the hydraulics in the drum weighing system does not occur
- Operator visibility is good and reading the Heise pressure gauge is easy
- Operation of the gauge shutoff valve by the operator in the cab is easy.

5.7.4.3 Performance Test Report

The Subcontractor shall submit to the Contractor the in-shop testing report following the testing outlined in Section 5.7.4.1.

5.7.5 Special Processes

Not applicable.

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5.8 Packaging And Shipping

5.8.1 Packing and Packaging

Packaging and shipping shall be performed in accordance with the backhoe shipment to the INEEL. The drum weighing system shall not be disconnected from the backhoe after in-shop testing is complete.

5.8.2 Marking and Handling

Not applicable.

5.8.3 Special Transportation Requirements

Only transportation requirements that pertain to shipment of the backhoe to the INEEL apply.

5.9 Installation and Maintenance

5.9.1 Installation

The drum weighing system shall be installed into the CAT 446B backhoe at the Subcontractor's facility as shown on Contract Drawing 519931.

5.9.2 Startup and Calibration

Not applicable.

5.9.3 Training

The Contractor's backhoe operator representative shall be trained on the drum weighing system at the Subcontractor facility before shipment and acceptance.

5.9.4 Maintenance

See special tools list (see Section 5.6.2).

5.10 Marking and Identification

Not applicable.

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5.11 Acceptance

5.11.1 Final Acceptance Method

Performance of the test, training of the operator, and submittal and approval of all documents listed on the vendor data schedule will constitute acceptance of the drum weighing system.

5.11.2 Inspection and Hold Points

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the drum weighing system components will be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold-point inspection.

5.11.3 INEEL Surveillance and Audits

The authorized Contractor representative may perform source inspection or surveillance.

5.12 Attachments

Form 531.14, "Vendor Data Schedule."

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Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - Project 021052 -
DRUM WEIGHING SYSTEM No. 24713

System
Engineer/ DAVIES STEVEN A Date: 17-JUN-02 Rev: 1
Project
Manager

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only
2	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
3	6.3	Operating Instructions	AZ. Other	4	PS - Prior to Shipment	Information Only
4	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	Approval Required
5	6.6.1		AR. Weld Procedure Qualificaion	4	BFR - Before Fabrication Release	Approval Required
6	6.6.2		AS. Welder Performance Personnel Qualifications	4	BFR - Before Fabrication Release	Approval Required
7	6.6.3	Non-Destructive Examination Procedures	AZ. Other	4	BFR - Before Fabrication Release	1. Approval Required
8	6.6.3		AT. Non-Destructive Examination Personnel Certifications	4	BFR - Before Fabrication Release	1. Approval Required
9	7.4.1		W. Test Procedure	4	PT - Prior to Test	1. Approval Required
10	7.4.3		Z. Test Reports	4	AT - After Test	1. Approval Required

- Instructic
1. Refer to subcontract documents for instructions on submittals.
 2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
 3. The normal number of copies required is ONE. If more are required, the number will be shown here.
 4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.

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6. FIRE SUPPRESSION

6.1 Summary

6.1.1 General

The Operable Unit (OU) 7-10 Glovebox Excavator Method Project plans to retrieve 75 to 125 cubic yards of radioactively contaminated waste from OU 7-10 (Pit 9) using a standard commercial backhoe modified to operate through the Retrieval Confinement Structure wall. Using this system allows waste to be retrieved remotely without operator exposure to the contaminated environment inside the Retrieval Confinement Structure.

The CAT 446B backhoe used in this project shall incorporate two forms of fire suppression. First, all hydraulic fluid shall be purged from the backhoe and replaced with fire-resistant hydraulic fluid. Second, a fire suppression system shall be incorporated throughout the engine compartment of the backhoe.

6.1.1.1 Fire-Resistant Hydraulic Fluid

The American Chemical Technologies EcoSafe FR-46 is a nonaqueous, polyalkylene glycol, fire-resistant hydraulic fluid, with a Factory Mutual II fire resistance rating. As a point of reference, commonly used mineral oil-based hydraulic fluid will typically have a Factory Mutual III fire resistance rating (the least fire-resistant rating level).

Depending on the level of fire resistance required by regulation and by insurers, polyalkylene glycol products, such as EcoSafe FR fluids, typically provide improved wear characteristics over the water or glycol products, and in many cases may provide wear characteristics equivalent to or better than the mineral-based hydraulic oil. The polyalkylene glycol products typically provide a level of fire protection between normal mineral-based hydraulic fluids and water- or glycol-based hydraulic fluids.

Because of the improved fire resistance of the polyalkylene glycol hydraulic fluid (EcoSafe FR-46) and minimal backhoe modifications to accommodate such a fluid, the EcoSafe FR-46 fluid was chosen as the optimum fire-

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resistant hydraulic fluid to be incorporated into the CAT 446B backhoe.

6.1.1.2 Fire Suppression System

Simplex Grinnel, a company based in Pocatello, Idaho, that distributes ANSUL brand fire suppression systems, is the recommended company who shall supply the pre-engineered fire suppression system for the CAT 446B backhoe. Based on conversations, drawings, and interface with Simplex Grinnel by Caterpillar Incorporated, an ANSUL LTA-101-30 pre-engineered fire suppression system was recommended.

The Subcontractor shall install cable detectors throughout the engine compartment of the CAT 446B and connect the system back to a pneumatic actuator. A secondary operator-actuated switch shall be mounted in the cab of the backhoe. The distribution-piping (hose) network shall be designed to properly distribute the dry chemical to the nozzles located in strategic positions throughout the backhoe.

The system shall be capable of automatic detection and actuation and remote manual actuation. When a fire is detected, the LTA-101-30 system, which operates the pneumatic actuator, is actuated either manually or automatically, rupturing a sealed disc in the expellant gas cartridge. This pressurizes and fluidizes the dry chemical extinguishing agent in the agent storage tank. When the agent storage tank reaches a specific pressure, it ruptures a burst disc and propels the dry chemical through the network of distribution hoses. The dry chemical is discharged through fixed nozzles and into the protected areas, suppressing the fire.

The automatic detection portion of the fire suppression system shall incorporate electric detection through the use of a linear detection wire.

The fire suppression system shall be capable of providing total flooding or local application hazard protection for mobile equipment and industrial hazards.

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The basic system consists of the following:

- Dry chemical agent storage tank(s)
- Expellant gas cartridge
- Distribution piping (hose) and nozzles
- Manual and automatic actuator
- Automatic detection system, and accessories (see Figure 6-1).

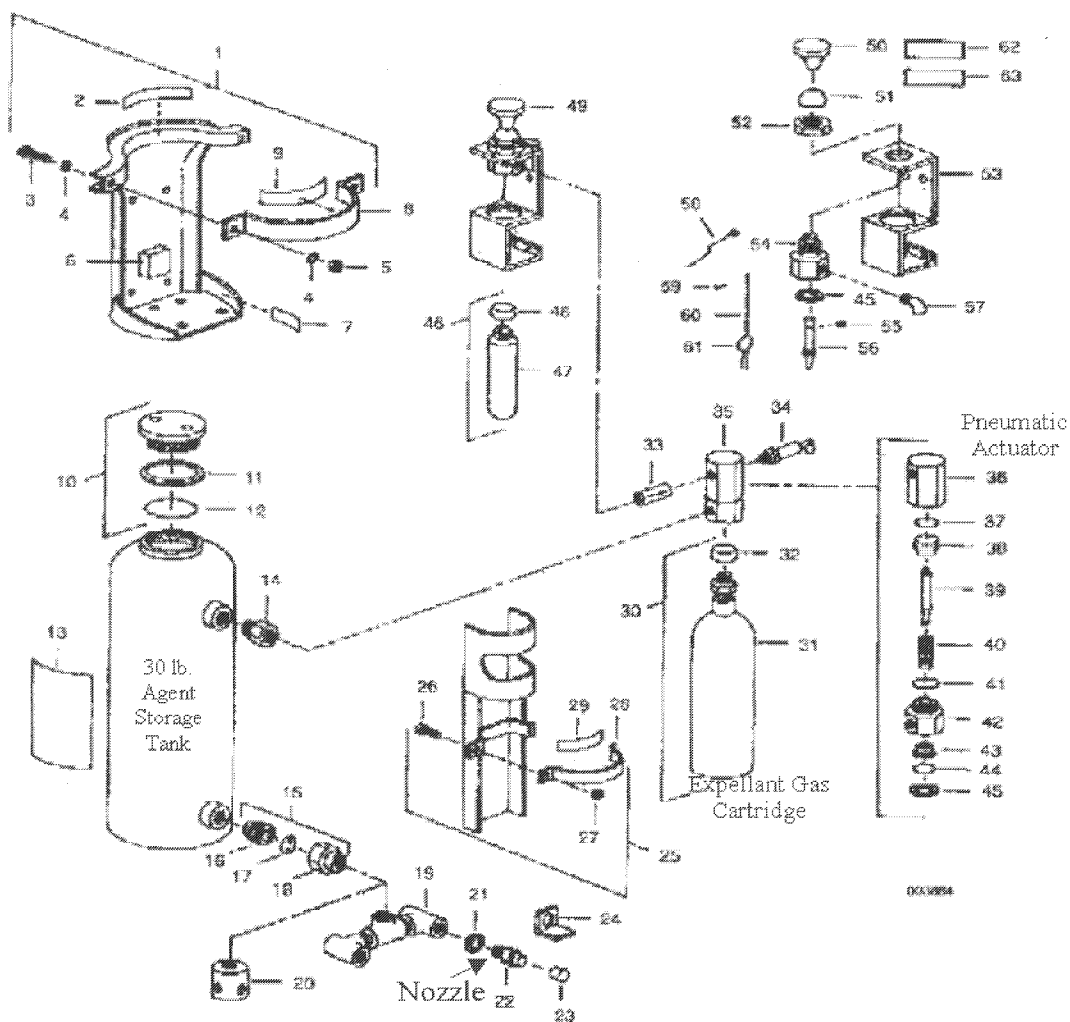


Figure 6-1. ANSUL brand LTA-101-30 fire suppression system.

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6.1.2 Work Included

It is not the intent of this specification to completely define all details of installation. Equipment shall be purchased, fabricated, assembled, and installed in accordance with this specification and standard practices of the equipment suppliers and Subcontractor when such practices do not conflict with this specification.

The fire suppression system and all associated hardware shall be completely assembled and installed into the CAT 446B backhoe at the Subcontractor facility.

The following shall be delivered to the INEEL:

1. A complete and fully integrated design of the LTA-101-30 fire suppression system on a CAT 446B backhoe
2. A CAT 446B backhoe, incorporating EcoSafe FR-46 hydraulic fluid in all hydraulic functions
3. Vendor data submittals in accordance with vendor data schedule and this specification.

6.1.3 Work Not Included

None identified.

6.1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the CAT 446B backhoe loader.

6.2 Applicable Codes, Procedures, and References

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

6.2.1 National and Local Codes

Occupational Safety and Health Administration:

- “29 CFR 1910, Occupational Safety and Health Standards”

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- “29 CFR 1926, Safety and Health Regulations for Construction.”

6.2.2 Industry Procedures and DOE Orders

American National Standards Institute (ANSI)/National Fire Protection Association (NFPA):

- “ANSI/NFPA 70, 2002 National Electrical Code”
- “ANSI/NFPA 17, Standard for Dry Chemical Extinguishing System”
- “ANSI/NFPA 121, Standard on Fire Protection for Self-Propelled and Mobile Surface Mining Equipment.”

American Institute of Steel Construction, LRFD Manual of Steel Construction

American Society of Mechanical Engineers, ASME Boiler and Pressure Vessel Code, Section V

American Society of Testing and Materials (ASTM):

- “ASTM A36, Standard Specification for Carbon Structural Steel”
- “ASTM A570, Standard Specification for Steel, Sheet and Strip, Carbon, Hot-Rolled”
- “ASTM A325, Standard Specification for Structural Bolts, Steel, Heat Treated 120/105 ksi Minimum Tensile Strength.”

Society of Automotive Engineers (SAE):

- “SAE J31, Hydraulic Backhoe Lift Capacity.”
- “SAE J1097, Hydraulic Excavator Lift Capacity Calculation and Test Procedure.”
- “SAE J1177, Hydraulic Excavator Operator Controls.” (This specification is provided for reference only. It is not a requirement.)

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- “SAE J1179, Hydraulic Excavator Digging Forces.” (This specification is provided for reference only. It is not a requirement.)
- “SAE J1336, Hydraulic Cylinder Leakage Test.” (This specification is provided for reference only. It is not a requirement.)

6.2.3 Military (National) Specification

Not applicable.

6.2.4 Related Specifications

Not applicable.

6.2.5 References

Not applicable.

6.3 Technical Requirements

6.3.1 General

The fire suppression system shall be designed by the equipment supplier to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the design requirements for the fire suppression system.

6.3.1.1 CAT 446B Backhoe Fire Suppression System:

- Shall be a Simplex Grinnel ANSUL LTA-101-30 pre-engineered fire suppression system.
- Shall provide fire suppression for a wide range of fuel sources.
- Shall have a temperature range between -54 and 99°C (-65 and 210°F).
- Shall be capable of automatic or manual activation.
- Shall be configured for engine shutdown upon activation.

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- Shall provide auxiliary contacts for future connection to the WES fire alarm system. These contacts shall be normally open.

6.3.2 Restrictions

None identified.

6.3.3 Performance Requirements

6.3.3.1 Fire-Resistant Hydraulic Fluid

- Nonaqueous, polyether polyol hydraulic fluid shall be used
- Hydraulic fluid shall be approved by Factory Mutual Research as Group II
- Fluid supplier shall provide the recommended change-out procedure for switching from a conventional hydraulic fluid to the polyether polyol hydraulic fluid
- Hydraulic fluid shall not adversely affect sealing surfaced within the backhoe hydraulic system

6.3.3.2 Fire Suppression System

- A. Fire protection system shall be a pre-engineered system with the distribution-piping (hose) network designed to properly distribute dry chemical to nozzles located in strategic positions throughout the backhoe engine compartment
- B. Cable detectors shall be run throughout the engine compartment of the backhoe and tie the system back to a pneumatic actuator
- C. A secondary operator actuated switch shall be mounted in the cab of the backhoe
- D. The system shall be capable of automatic detection and actuation and remote manual actuation.

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- E. The automatic detection portion of the fire suppression system shall incorporate electric detection through the use of a linear detection wire.
- F. The fire suppression system shall be capable of providing total flooding or local application hazard protection for mobile equipment and industrial hazards.
- G. The agent storage tank shall be designed for temperatures from 0 to 49°C (32 to 120°F).
- H. Nitrogen gas shall be selected for the expelling gas.
- I. A 30-lb agent tank containing 25 lb of monoammonium phosphate base (multipurpose dry chemical) shall be provided.
- J. The fire suppression system shall consist of the following components:
 - Tank-mounted bracket
 - Installation manual
 - N₂ cartridge
 - Cartridge bracket
 - Pneumatic actuator
 - Transfer lines and nozzles
 - Temperature-sensitive linear wire detectors
 - Total flooding capacity of 1,000 ft³.

6.3.4 Software

Not applicable.

6.3.5 Registered Professional Engineer Certification

Not applicable.

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6.3.6 Human Factors

The design shall use human factor engineering principles and criteria such that all equipment is easily maintainable. The design shall provide access to each system component (located outside the Retrieval Confinement Structure) for operation, cleaning, and maintenance.

6.3.7 Reliability and Maintainability

6.3.7.1 Reliability

- A. All subcomponents of the fire suppression system shall be of a quality that the expected mean time between failure for this system shall not be less than 1,080 hours.
- B. The automated fire suppression equipment bearings, fittings, and controls shall be sealed against moisture and damaging particle intrusion using standard industrial components to the extent practicable.
- C. The fire suppression systems shall employ rugged, industrial, off-the-shelf equipment to the maximum extent practicable.
- D. The fire suppression control system hardware and software shall be based on industry standard components that have been proven in similar systems.

6.3.7.2 Maintainability

- A. The fire suppression system shall be designed and assembled to facilitate ease of inspecting, servicing, and maintaining equipment.
- B. Standard replacement parts within the fire suppression systems, shown on manufacturer's recommendations, shall be readily available for routine maintenance activities.

6.3.8 Environmental Regulatory Requirements and/or Site and Operating Requirements

Not applicable.

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6.3.9 Natural Phenomena Requirements

Not applicable.

6.4 Environmental, Safety, and Health Requirements

6.4.1 Subcontractor Safety

The Subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements as stated in 29 CFR 1910.

6.4.2 Personal Protective Equipment

The Subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

6.4.3 Emergency Response

Not applicable.

6.4.4 Accident Investigation

Not applicable.

6.5 Manufacturing and Assembly

6.5.1 General

6.5.1.1 Fire-Resistant Hydraulic Fluid

Conversion of the CAT 446B hydraulic system to EcoSafe FR-46 hydraulic fluid shall be performed within the Subcontractor shop to ensure proper conversion. The Contractor technical representative (or alternate) will inspect the assembled final product. Operations shall be performed in a clean, dust-free area of the Subcontractor facility.

6.5.1.2 Fire Suppression System

The fire suppression system shall be assembled and installed on the CAT 446B backhoe in the Subcontractor shop to ensure proper fit and operation. The Contractor technical

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representative (or alternate) shall inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the Subcontractor's facility.

6.5.2 Prohibitions

None identified.

6.5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials not specified herein shall be of the same quality used for the intended purpose in standard commercial practices of the equipment manufacturer.

6.5.4 Fabrication

Not applicable.

6.5.5 Equipment Tagging

Not applicable.

6.5.6 Cleaning, Painting, and Coating

Not applicable.

6.5.7 Spare Parts

The applicable standard quality requirements identified in the procurement package shall be cross referenced.

6.5.8 Other Processes

Not applicable.

6.6 Submittals

As a minimum, the Subcontractor shall provide the Contractor with the submittals referenced in this section. The Subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract

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documents. The quantities and submittal schedule are included in the attached vendor data schedule.

6.6.1 General Submittal Requirements

6.6.1.1 General Procedures

Vendor data, whether prepared by the Subcontractor or Subcontractor's subtier or supplier, shall be submitted as instruments of the Subcontractor. Therefore, before submittal, the Subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications.

Each submittal shall contain (1) identification for each separable and separate piece of material or equipment and (2) literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

6.6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, specification reference, and description of the item or service. The type of submittal is identified by a vendor-data code, and the time required to submit the item is identified by a when-to-submit code. An approval code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required. Additional copies may be required by the vendor data schedule. Electronic file submittals are preferred.

6.6.1.3 Vendor Data Transmittal and Disposition Form 431.13, "Construction Vendor Data Transmittal & Disposition Form"

All vendor data shall be submitted to the Contractor using the Form 431.13. This form provides a method for the

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Subcontractor to submit vendor data and a means for the Contractor to disposition the submittal. The Subcontractor shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or resubmittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what the submittal includes.

6.6.1.4 Disposition by the Contractor

Comments from the Contractor and required action by the Subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

- A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.
- B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the Contractor before construction.
- C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected resubmittal for one of the following reasons:
 - 4. Submittal requires corrections, shown on comments, before final review
 - 5. Submittal data are incomplete and require more detailed information before final review
 - 6. Submittal data do not meet subcontract document requirements.

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- D. **Accepted for Use. Information Only Submittal:**
Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Mandatory approval-coded vendor data will be reviewed by the Contractor and receive an A, B, or C disposition. Information-only submittals without comments will receive a D disposition. A, B, and C coded dispositioned submittals will be returned to the Subcontractor. D dispositioned submittals will not be returned to the Subcontractor. The Contractor may provide internal review of information-only submittals. In the event that comments are generated on an information-only submittal, the submittal may be dispositioned B or C and returned to the Subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the Subcontractor will not be required.

The Contractor will return dispositioned submittals with reasonable promptness. The Subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

6.6.2 Spare Parts and Special Tools List

The Subcontractor shall submit to the Contractor a list of recommended spare parts and any special tools required for operation and maintenance of the fire suppression system. This list shall include all corresponding suppliers of each component and associated phone numbers.

6.6.3 Operating and Maintenance Manuals

The operations and maintenance manual shall cover the installation, operation, and maintenance of the fire suppression equipment in detail. All drawings, diagrams, and record forms required for the installation shall be included and incorporated in the manual.

6.6.4 Drawings

The equipment supplier or Subcontractor shall submit prints of the final red line drawings disclosing the configuration of the fire suppression

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system. These drawings shall document the mechanical, electrical, and instrumentation configuration.

6.6.5 Software

Not applicable.

6.6.6 Material Safety Data Sheets

Before fabrication release, the Contractor shall approve any material safety data sheets. The Contractor shall submit material safety data sheets for approval on any material that periodically requires disposal. This allows the Contractor to verify waste acceptance and disposal requirements. Suspect or known carcinogenic materials are not acceptable for use.

6.6.7 Inspection and Testing

An ANSUL certified distributor shall inspect/test the installed system in accordance with factory requirements and provide a certification form or equivalent documenting that the system has been installed and operates properly.

6.7 Quality Assurance

The Subcontractor shall implement all quality assurance measures in accordance with this specification.

6.7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled and installed by a firm that has prior experience pertaining to the installation of an automated fire suppression system within the CAT 446B backhoe.

The hydraulic fluid shall be replaced by a firm that has prior experience pertaining to replacement of standard hydraulic fluid with a fire-resistant hydraulic fluid within the CAT 446B backhoe.

6.7.2 QA Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

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Subcontractor quality requirements and all standard procurement requirements will be listed in the procurement package.

6.7.3 Nondestructive Examination

Not applicable.

6.7.4 Operational Testing

Not applicable.

6.7.5 Special Processes

Not applicable.

6.8 Packaging and Shipping

6.8.1 Packing and Packaging

Not applicable.

6.8.2 Marking and Handling

Not applicable.

6.8.3 Special Transportation Requirements

Not applicable.

6.9 Installation and Maintenance

6.9.1 Installation

The fire suppression system shall be installed in the CAT 446B backhoe at the Subcontractor's facility.

6.9.2 Startup and Calibration

Not applicable.

6.9.3 Training

NOTE: *It is anticipated that the fire suppression system will be simple enough that formal training above and beyond the instructions provided will not be required.*

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The Subcontractor shall provide any required training exceeding the instructions provided with the fire suppression system to an INEEL representative, who will then provide training to other INEEL personnel who require training.

6.9.4 Maintenance

The fire suppression system manufacturer(s) shall provide recommended maintenance instructions for the automated device and all associated equipment.

The Subcontractor and manufacturer shall provide any additional backhoe maintenance requirements that may result from the use of fire-resistant hydraulic fluid.

6.10 Marking and Identification

Not applicable.

6.11 Acceptance

6.11.1 Final Acceptance Method

Submittal of all documents listed on the vendor data schedule will constitute acceptance.

6.11.2 Inspection and Hold Point

Unless otherwise specified by the purchase order, the supplier shall notify the Contractor at least 5 working days in advance of the time that the fire suppression system shall be available for source inspection by the Contractor representative. Work cannot proceed without written authorization from the Contractor after hold point inspection.

6.11.3 INEEL Surveillance and Audits

The authorized Contractor representative may perform source inspection or surveillance.

6.12 Attachments

Form 431.14, "Vendor Data Schedule."

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Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICATION - FIRE SUPPRESSION Project No. 021052 - 21996

System Engineer/Project Manager DAVIES STEVEN A Date: 12-APR-02 Rev: 1

Vendor Data Coordinator Address POOLE M ANNETTE, TSB-1WI404, MS: 3915

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualification AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

Specification Environmental Restoration	BACKHOE MODIFICATIONS FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT	Identifier: SPC-401 Revision: 1 Page: 6-20 of 6-20
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Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
1	3.3.1-C	Change-out Procedure	AZ. Other	4	PTI - Prior to Installation	Approval Required
2	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
3	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only
4	6.3		L. O&M Manual	4	PS - Prior to Shipment	Information Only
5	6.4		R. Red_line Drawings	4	PS - Prior to Shipment	Approval Required
6	6.6		AE. MSDS	4	BFR - Before Fabrication Release	Approval Required
7	6.7	Certification	AZ. Other	4	PT - Prior to Test	1. Approval Required

Instructions: 1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.